BERTHS 26 TO 31

JEDDAH ISLAMIC PORT PROJECT

METHOD STATEMENT for

BORED PILES

DOCUMENT NO: KASK-2023-U-SA-01-DE-MS-001-R02

02	06.09.2023	Genel Revision	Atalay Mert Turgut	Gokhan Guleryuz	Serkan Yolacan
01	13.08.2023	Bentonite is added	Atalay Mert Turgut	Gokhan Guleryuz	Serkan Yolacan
00	17.04.2023	First Issue	Atalay Mert Turgut	Abdusselam Gulec	Serkan Yolacan
Rev	**Date**	**Reason for Revision**	**Prepared By**	**Checked By**	**Approved By**

TABLE OF CONTENTS

1. SCOPE OF WORKS 4

2. DEFINITIONS, ACRONYMS AND ABBREVIATIONS 4

2.1 General Definitions 4

2.2 Specific Terms, Definitions, Acronyms and Abbreviations 5

3. REFERENCE DOCUMENTS and STANDARDS 5

4. RESPONSIBILITIES & AUTHORITIES OF PERSONNEL 6

4.1 Contractor's Role and Responsibilities 6

4.1.1 Project Manager 6

4.1.2 QA/QC Engineer 6

4.1.3 HSE Officer 7

4.1.4 Technical Office Engineer 7

4.1.5 Site Manager 7

4.1.6 Site Engineer 8

5. SUPERVISION & MONITORING ARRANGEMENTS 8

6. RESOURCES 8

6.1 Personnel 8

6.2 Equipment 9

6.3 Materials 9

6.3.1 Concrete (*) 9

6.3.2 Reinforcement (*) 9

7. CONSTRUCTION METHOD 9

7.1 Machine Rigging 9

7.2 Survey Grid & Setting Out 10

7.3 The Stability of Drilling Borehole 10

7.3.1 Temporary Casing (Installation by Casing Oscillator) 10

7.3.2 Temporary Casing (Installation by Drilling Rig) 10

7.3.3 Polymer 11

7.4 Drilling 11

7.4.1 Depth 11

7.5 Reinforcement Cages 12

7.5.1 Fabrication 12

7.5.2 Lifting & Joining 12

7.5.3 Installation 13

7.6 Pile Concreting 13

8. QUALITY CONTROL 13

9. APPENDICES 14

9.1 Bored Pile Record Sheet *14*

9.2 ITP for Bored Piles *15*

9.3 Risk Assessment *17*

9.4 Machinery Catalogue *30*

9.5 Schematic Sketchs for the Bored Piles Execution with Casing and Supporting Fluid *43*

9.6 Schematic Sketch for Polymer Setup *49*

9.7 Trench Stability Analysis for the Bored Piles Execution with Casing and Supporting Fluid *50*

9.8 Quality and Safety Sheets for Polymer *53*

1. SCOPE OF WORKS

The objective of this method statement is to provide guidance of bored piles in the content of Jeddah Islamic Port the Berths 26 to 31, located in Saudi Arabia.

If prevailing site conditions preclude practical application of the whole or parts of the procedure explained below, alternative techniques may be applied with the approval of Client's Engineers. All alternative techniques will be in conformity with the generally accepted bored, cast-in-place piling (shoring purpose) practice available in Literature.

2. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

2.1 General Definitions

KASKTAS is Kasktas Arabia LTD

The word "**shall**" be used to indicate that a provision is mandatory.

The word "**should**" be used to indicate that a provision is not mandatory but recommended as good practice.

All dates are being written as **[dd-mm-yyyy]** unless mentioned otherwise.

Term / Acronym / Abbreviation	Explanation / Definition
EMPLOYER	PC MARINE SERVICES Co.
EMPLOYER'S REPRESENTATIVE	
PROJECT	Jeddah Islamic Port the Berths 26 to 31 – Shoring Works
CONTRACT	PCM/2240/23/001
DESIGNER	KASKTAS ARABIA LTD.
CONTRACTOR	KASKTAS ARABIA LTD.
Quality Assurance (QA)	is part the of quality management focused on increasing the ability to fulfil quality requirements.
Quality Control (QC)	is the operational techniques and activities that are used to fulfil the requirements for quality.
HSE	Health, Safety and Environment
MS	Method Statement. A document which details the overall technical / engineering / quality / safety / environmental methodology for a particular construction package (i.e., bridge, section of road etc.). A macro description of the construction methodology to be applied to the works package.

ITP	Inspection & Test Plan
PPE	Protective Personal Equipment
RFI	Request For Information
AFC	Approved For Construction.
TBD	To Be Developed

2.2 Specific Terms, Definitions, Acronyms and Abbreviations

For the purpose of this method of statement, the following terms and definitions apply:

Term / Acronym / Abbreviation	Explanation / Definition
Pile	The vertical column member that is made of reinforced concrete constructed in boreholes drilled in the ground. The concrete is placed through tremie pipes.
Tremie pipe	A series of pipes with water-tight couplings for placing concrete beneath the water in order to avoid contamination and segregation.
Casing	A temporary steel casing in required thickness that is driven into ground by means of vibration, rotation of the piling machine or oscillator in order to stabilize the walls of the borehole. Their length also depends on the soil conditions.
Working platform	The level where the machinery and equipment are expected to be operated throughout each activity
Cut-off level	The designed topmost uncontaminated concrete level of a construction item at which construction of the following reinforced concrete item will be resumed.
Deviation	A value that differs significantly from an expected value.
Polymer	A support fluid to be used to ensure the stability of the borehole

3. REFERENCE DOCUMENTS and STANDARDS

The references and documents listed below relate to the Scope of Works defined within this MS.

- Project Technical Specification
- Project HSE Plan
- Project Quality Plan
- Project Risk Assessment
- British Standards Institution. (2015). BS EN 1536:2010+A1:2015: Execution of special works – Bored piles. London: BSI.
- The Institution of Civil Engineers. (2007). ICE specification for piling and embedded retaining walls (2nd ed.). Thomas Telford Ltd, Telford House, London.

4. RESPONSIBILITIES & AUTHORITIES OF PERSONNEL

4.1 Contractor's Role and Responsibilities

All operations will be performed under the strict supervision of the Contractor during execution of the works. All operations will be performed under the supervision of:

4.1.1 Project Manager

Project Manager will be fully authorized to represent the Contractor on all piling work MS. Project Manager will report to The Employer accordingly.

- Ensure the comprehension and implementation of health and safety policy by all project personnel.
- Ensures the comprehension and implementation of the Quality Plan and other subsequent quality obligations.
- In charge of the overall and daily management of the performance of the works, in compliance with the provisions of the Contract.
- Coordinate daily project activities such as:
    - control of internal resources allocated to the project;
    - the resolution, together with other departments, of any problems which might arise during the construction phase;
    - issue of purchase requisitions by indicating delivery terms and costs;
    - resolution of internal non-conformities, technical queries, concessions, together with project resources;
    - co-ordination of project activities as to prevention, protection, and environmental safeguard;
    - control of documents flows from and to the Employer and distribution to departments involved;
    - updating and preservation of project technical and contractual documents;
    - updating and control of the list of equipment withdrawn from the warehouse and relevant return;
- Manages and takes necessary measures on cost, planning, and procurement-related subjects.
- Ensures that all staff are qualified and trained for the job they are in charge of and ensures that all staff understands their roles and responsibilities clearly.

4.1.2 QA/QC Engineer

QA/QC Engineer having granted with an equal power on the matters of his responsibilities related with the Pile Works MS, of the Concrete and Reinforcement Works with the Pile Works, in coordination with the QA/QC Engineer of the Employer, but also report to the Project Manager on administrative matters.

- Development of quality requirements and testing related to the work to be executed.
- Ensuring implementation of Employer's Quality Assurance Plan and procedures.
- Working together with the Project Manager for establishing, maintaining, and implementing Quality System at the job site.
- To plan, organize, implement, and assist internal quality audits of the site,
- Reviewing results of internal quality system audits, initiate corrective/preventive/improvement actions and follow-up the close-out of audit findings,

- To follow up on the day-to-day activities and the performances of Contractor work.
- Preparation of instructions, when required, for receipt, inspection, maintenance, and storage of permanent material.
- Producing the necessary site modifications to procedures and implementation.
- To establish and maintain the quality control system for controlling nonconforming items identified at the job site.

4.1.3 HSE Officer

HSE Officer having granted with an equal power on the matters of his responsibilities in relation with the Pile Works MS, i.e., obtaining permits, in coordination with the HSE Officer of the Employer and report to the Project Manager on administrative matters.

- Report to Project Manager.
- Develop HSE Plan in conjunction with Project Manager.
- Attend continuous professional development and educational program and courses where available.
- Promote the "Zero Accident" philosophy.
- Coordinate HSE activities with the Employer.
- Conduct periodical HSE assessments/meetings.
- Overall coordination of Safety awareness & motivational programs.
- Conduct HSE orientations to acquaint employees with conditions, safe work practices, and procedures.
- Conduct Safety training programs.
- Train and advise personnel on HSE regulations, assessments, and process activities.

4.1.4 Technical Office Engineer

Technical Office Engineer will coordinate shop drawings and reports and to ensure the complies with Contract requirements and assist the team for technical matters and will report to the Project Manager.

4.1.5 Site Manager

Site Manager will coordinate all construction activities related with the Pile Works MS obtaining related construction permit in correspondence with QA/QC and HSE procedures and will report to the Project Manager.

- Ensure the comprehension and implementation of health and safety policy by all project construction personnel.
- Implementation of Contractor’s HSE Plan, and other operational procedures.
- Ensure emergency arrangements and resources remain effective.
- Commanding authority in case of any emergency on-site.
- Maintain relationships and represents Contractor management at the site.
- It oversees the overall and daily construction management of the performance of the works at the site.
- Prepare and periodically verify the construction program.
- Keep the Project Manager continuously informed about construction progress.
- Manages and takes necessary measures on cost and procurement-related subjects.

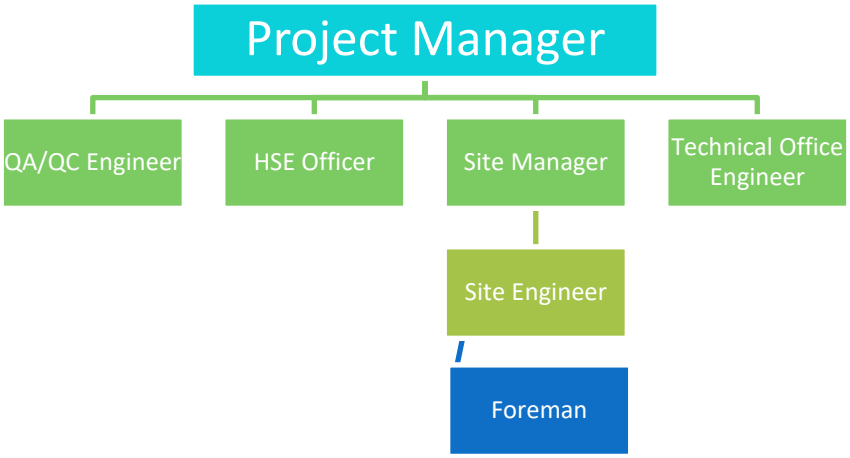
4.1.6 Site Engineer

Site Engineer is responsible for:

- Assigning qualified craft to perform the work,
- Providing supervision to the assigned craft to achieve the required work quality,
- Ensuring that the work is completed in accordance with the latest issued design documents,
- Being present at the inspection location during the inspection with QC and/or Employer's Representative.

5. SUPERVISION & MONITORING ARRANGEMENTS

Supervision of works will be performed according to below organization chart.



6. RESOURCES

6.1 Personnel

The following project organization is foreseen:

Name	Function	Phone number	E-mail
Gokhan Guleryuz	Project Manager	+966 59 519 23 87	gokhan.guleryuz@ kasktasarabia.com
Abdusselam Gulec	Site Manager	+966 50 360 71 36	abdusselam.gulec@ kasktasarabia.com
Atalay Mert Turgut	Technical Office Engineer	+966 55 825 53 37	atalay.turgut@ kasktasarabia.com

6.2 Equipment

This equipment list that is assigned for the project is shown in the table below.

Sufficient personnel will be provided for all equipment.

Item No	Description	Purpose
1	Piling rig	Drilling
2	Crawler crane	Concrete Casting and Reinforcement Installation
3	Welding Machine	Steel Installation, Maintenance and Repair etc.

6.3 Materials

6.3.1 Concrete (*)

The ready-mixed concrete to be used in the construction of piles shall comply with the specifications as shown in the drawings and shall have the following characteristics:

- Pile Concrete Class: C35
- The first slump value will be 220 ± 20 mm during casting after the concrete arrives.
- A detailed “Concrete Mix Design” should be submitted according to project specifications and requirements.

6.3.2 Reinforcement (*)

- Reinforcement will consist of deformed steel bars that conform to the requirements of project.
- Reinforcement shall be B500 grade.

(*) All material will be provided by the Main Contractor. All soil and material testing as required by Employer/Client, including but not limited to all tests on material to be carried out by an independent lab, etc. are responsibility of the Employer.

7. CONSTRUCTION METHOD

7.1 Machine Rigging

Machinery and equipment to be employed for pile construction are listed below:

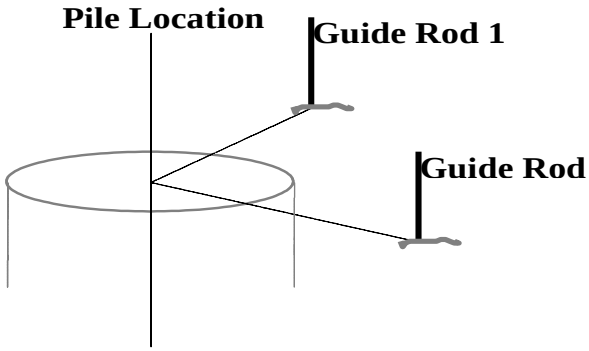
- Main machinery
  a. Hydraulic drill rig(s)
  b. Crawler Crane(s)
  c. Oscillator(s)
  d. Welding machine(s)
- Equipment
  a. Temporary casings (in required length)
  b. Augers & buckets

c. Core barrel
d. Tremie segments

- Optional machinery & equipment
  a. Air-compressor
  b. Chisel
  c. Pump
  d. Tanks & hoses

7.2 Survey Grid & Setting Out

The surveyors will stake out the exact center location of each pile using the reference points on site. Stakes shall be numbered in accordance with the numbering system on the piling drawings. These stakes will be handed over to the Engineer's surveyor, if required, and will be used to monitor correct positioning of the casing. The surveying service shall be provided by the Employer.



7.3 The Stability of Drilling Borehole

7.3.1 Temporary Casing (Installation by Casing Oscillator)

In order to guide boring, temporary casings in required lengths, to be determined by Contractor as per site and soil conditions, should be installed in the first place to serve as a guide during boring process. Casings should be driven and extracted by casing oscillator when required.

Casing position and verticality will be checked during and upon completion of driving by spirit level. Casing installation can be omitted in the locations where the ground conditions permit drilling of piles without casing.

7.3.2 Temporary Casing (Installation by Drilling Rig)

A temporary casing may be installed with rotation in required length by piling rig itself to maintain the stability of the borehole. In case hard stratum obstructs further installation of the casing, the borehole should be advanced without casing from that level down to the pile's toe level. In some cases, even a pre-boring may be necessary at the beginning due to the presence of hard strata in the topmost soil layer.

The piling rig shall be set in correspondence with the marked pile location. The position of each pile shall be checked immediately before the commencement of boring and after inserting of first casing.

The verticality of temporary steel casing can be checked by using "spirit levels" in any two perpendicular directions.

7.3.3 Polymer

The borehole stability will be maintained by using temporary casing in the required length and using support fluid together. The stability of the borehole is achieved by the pressure of the polymer slurry on the drilled walls. The partial casing length to be inserted will be approximately 20 m based on the actual soil conditions (after passing the backfill layer). After that level, supporting fluid is used to ensure borehole stability during drilling. The level of support fluid may vary during the drilling, but it does not fall below the depth which ensures the stability of the borehole.

The polymer mixture will be prepared in tanks. The level of tanks will be increased by concrete supports to be able to create flow from tanks to the drilling hole with the help of gravity loading. (Appendix 9.6)

7.4 Drilling

7.4.1 Depth

Pile drilling should be performed by hydraulic piling rig(s) equipped with augers and buckets of suitable sizes. Should hard strata be encountered other boring techniques may be referred to, including chiseling and/or introducing core barrels. In addition to checking verticality of the casing during installation, verticality of the borehole will be checked continuously. The auger and/or bucket shall then be lowered into the casing by means of the Kelly bar. The torque and pull-down force applied by the rotary head allows the penetration of the bucket into the soil. The loaded bucket will then be withdrawn from the borehole and cleaned out from the excavated material. Boring should continue until the pile toe level.

7.5 Reinforcement Cages

7.5.1 Fabrication

Reinforcement cages shall be delivered to the working area by the Employer according to approved Shop Drawings.

7.5.2 Lifting & Joining

The installation of reinforcement shall be carried out using a crane with a proper lifting capacity. The pre-fabricated reinforcement cage will be slowly and carefully hoisted by the crane and then lowered into the bored pile. In the meantime, spacers shall be installed to guide the cage into the borehole. The cage will be supported by ropes to reduce the bending stress and deformation during lifting. Each rope might be connected by means of a suitable bracket/lifting frame to avoid any localized over-stress.

During this operation, the first section of cage should be suspended while proceeding with the overlap of the upper section. Spacers (plastic or concrete) should be placed to the cages to ensure required concrete cover as per drawings.

Steel cages that are fabricated and fixed in design lengths should then be lowered into the borehole by a drilling rig and/or service crane.

Steel cages should be installed by taking reference from temporary steel casing top level. Hook bars should be used to keep the steel cages in its required level. In case some rebars of two steel cages are not matched during tightening, an additional 50Φ splice shall be applied and welded for both sides of the connection.

7.5.3 Installation

Prior to cage installation final depth of boreholes should be checked of the hole by means of measuring tape or rope with a suitable weight attached at the tip. Steel cages should then be lowered into the borehole, in the meantime spacers should be installed (if not yet) to guide the cage into the borehole and to ensure a required concrete cover.

7.6 Pile Concreting

Concreting will be done by tremie technique from bottom to up.

Once a tremie string is lowered in position (20 cm above the bottom of borehole), the tremie string should be raised slightly to allow concrete to flow out and be replenished simultaneously so the concrete level rises gradually at the bottom. The end of the tremie string should be kept at least 2~3 meters always embedded in the fresh concrete. Concrete should be placed also without significant interruption, which would lead to initial setting. Level of concrete may be measured continuously during pouring.

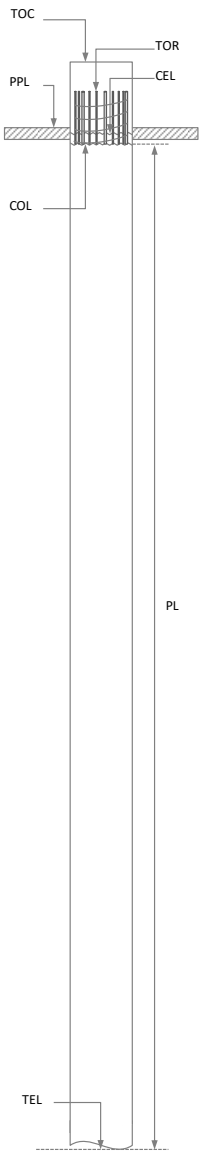
8. QUALITY CONTROL

All work under this method statement shall be subject to the quality principles and rules of the Project Quality Plan; activities will be monitored by the Quality Department to ensure project quality requirements are satisfied. Inspection and tests related to this method statement shall be in accordance with Inspection and Test Plan for Piling.

9. APPENDICES

9.1 Bored Pile Record Sheet

KASKTAŞ	XXX PROJECT						
	BORED PILE RECORD SHEET						
Location				Report No			
Drawings				Pile No			
Drilling Tools		Dim. of Drill Tools		Piling Rig		Guide Wall Plumb	No ☐ Yes ☐

Key Profile	Pile Details	Dwg	Actual	Unit	Remarks
Describe the muck for ground classification and plot the elevations on the Key Pile Profile.	Pile Diameter			mm	
	Pile Type			N/A	
	Pile cut-off elevation (COL)			m	
	Pile casting elevation (CEL)			m	
	Pile toe elevation (TEL)			m	
	Top of casing elevation (TOC)			m	
	Pile Ground elevation (PPL)			m	
	Depth from PPL to TEL			m	
	Length of temporary casing			m	
	Pile Length (PL = COL - TEL)			m	
	Top of reinforcement elevation (TOR)			m	
	Underground Water Level before concreting (from TOC)			m	

Survey Check		Drawing	Actual	Difference	Subc. Survey	ENKA Survey
Pile center coord.	N					
	E					

Timing	Start	End	Date	Remarks
Drilling				
Concreting				

Support Fluid used No ☐ Yes ☐ Specify — Pile Base Clean No ☐ Yes ☐

Reinforcement Checks

Related Drawings

Rebar Cage Checks	Subc	Client	Rebar Cage Checks	Subc	Client	Rebar Cage Checks	Subc	Client
Rebar Diameter & Length			Splices & Weldings			Cleanliness, Rust Free		
Gaps			Straightness			Binding		
Spacer frequency and cover			Spacer type & size			Spacer Label No		

Notes

Release for concreting

	SUBCONTRACTOR QC	CLIENT CONSTRUCTION	CLIENT QC	SUP. ORG.
Name				
Signature				
Date				

Concreting Information

Theoretical Concrete Quantity (m^3)	Actual Conc. Quantity (m^3)
Concrete Mix Design No & Grade	
Target Slump	mm

Notes

Notes

Bored Pile Complete

	SUBCONTRACTOR QC	CLIENT CONSTRUCTION	CLIENT QC	SUP. ORG.
Name				
Signature				
Date				

9.2 ITP for Bored Piles

No	Activity	Inspection / Test Method	Requirements Reference	Frequency	Acceptance Criteria	Verification Document / Quality Record	Involvements		
							Const.	QC	Cont. Rep.
1	Temporary casing inspection	• Visual inspection • Verify Casing position	The Institution of Civil Engineers Specification for piling Clause B3.3.2 and Clause B1.8.1, Table B1.4	Each pile	Temporary Casing shall be free from significant distortion. Verify Ø1200 mm (inner diameters of temporary casings) Plan position for pile casing with cut-off level at commencing surface is 75mm	Bored Pile Record Sheet	W/S	W/S	S
2	Pile drilling tool	• Visual inspection • Measure dimensions	The Institution of Civil Engineers Specification for piling Clause B3.3.2 and Clause B1.8.1, Table B1.4 and B1.10.2	Each pile	A tolerance on diameter of auger, casing, tool of up to 5% is permissible	Bored Pile Record Sheet	W/S	W/R	W/R
3	Vertical Tolerance of Pile	• Piling Rig Monitor	The Institution of Civil Engineers Specification for piling Clause B3.3.2 and Clause B1.8.1, Table B1.4 and B1.10.2	Each pile	1/100	Bored Pile Record Sheet	H/R	H/R	S/R
4	Horizontal Tolerance of Pile	• Survey Check	The Institution of Civil Engineers Specification for piling Clause B3.3.2 and Clause B1.8.1, Table B1.4 and B1.10.2	Each pile	±150 mm	Bored Pile Record Sheet	H/R	H/R	S/R
5	Steel certificate	• Check delivery notes	As per Project Drawings	Each delivery	B500	Bored Pile Record Sheet	H/R	W/R	W/R

6	Reinforcing Cage Inspection	• Verify geometrical dimensions of the cage section. • Verify number of longitudinal bars arranged in equal distances. • Verify number of lateral reinforcement and their spacing • Verify stirrup spacings. • Verify good and sufficient wire tying. • Verify the overlap length. • Verify concrete cover numbers and measures	As per Project Drawings	Each pile	75mm concrete cover Measures in the reinforcement drawings will be satisfied. Intersecting bars will be fixed together by double steel wire or welding.	Bored Pile Record Sheet	H/R	W/R	S/R
7	Concrete Slump	• Slump Test • EN 12350-2	Method Statement for Bored Piles	On each Mixer	220±20 mm	Bored Pile Record Sheet	H/R	W/R	W/R
8	Concrete Temperature	• Thermometer	EN 206:2013	On each Mixer	> 5 °C	Bored Pile Record Sheet	H/R	W/R	W/R
9	Concrete Grade	• Delivery Note	As per Project Drawings	On each Mixer	C35	Bored Pile Record Sheet	H/R	W/R	W/R
10	Tremie pipe length	• Measure the pipe length	The Institution of Civil Engineers Specification for piling	Each pile	Tremie pipe should always penetrate the concrete minimum 2.0m	Bored Pile Record Sheet	H/R	W/R	N/A
11	Viscosity of Fresh Polymer Mixture	• Measure viscosity	BS EN 1536:2010 Clause 6.2.2: Polymer Solution and Clause 6.2.2.3: Manufacturer instruction	Each Mixture	Recorded at each mixture	Bored Pile Record Sheet	H/R	W/R	W/R
12	Density of Fresh Polymer Mixture	• Measure density	BS EN 1536:2010 Clause 6.2.2: Polymer Solution and Clause 6.2.2.3: Manufacturer instruction	Each Mixture	Recorded at each mixture	Bored Pile Record Sheet	H/R	W/R	W/R

9.3 Risk Assessment

RISK ASSESSMENT METHOD

Risk: Probability x Frequency x Severity

Probability:

Probability Value	Explanation
0.2	Not Expected
0.5	Not Expected, but possible
1	Possible, but low probability
3	Possible (probable)
6	High probability (Highly likely)
10	Definite

Frequency: (Frequency of exposure to the hazard)

Frequency Value	Explanation
0.5	Very rare - 1 time per year or less
1	Sparse - a few times per year
2	NOT OFTEN - one time or several times a month
3	occasionally - once or several times a week 1
6	often - 1 time per day
10	continuous - several time per day

Severity Value	Explanation
1	Near Miss
	No Damage
3	Minor injuries, internal first aid
	Small property damage (damage <$ 500)
7	Injury, external first aid needs
	Property damage ($ 500 <damage <$ 1,500)
15	Limb loss, long-term job loss
	Serious property damage medium-cost ($ 1,500 <damage <$ 5,000)
40	fatal accident
	The high cost of property damage ($ 5,000 <damage < $ 25,000)
100	Multiple fatal accident
	Very high cost of property damage (damage> $ 25,000)

RESULTS OF RISK ASSESSMENT	
RANGE of RISK	Explanation
0 – 25	(1) Negligible Risk - Prevention is not a priority
25 – 100	(2) Low Risk - is recommended to be implemented under observation
100 – 250	(3) Considerable Risk - In the long term (in years) need to be improved
250 – 500	(4) Serious Risk - Short-term (a few months) need to be improved
500<	(5) Intolerable Risk - immediately (within a few days) precautions should be taken

RISK ASSESSMENT FORM

No	Activity	Description of Hazard	Exposed to Hazards People	Primary Risk Assessment (Present Status)					Risk Control Methods	Responsibility	Secondary Risk Assessment (After the implementation of the Risk Control Methods)				
				P	F	S	R.V.	Risk Result			P	F	S	R.V.	Risk Result
1	Mobilization - Manuel Handling	Much load on shoulder, during small material/equipment manual handling	Workers	3	2	15	90	(2) Low Risk	- More than 25 kg heavy load doesn't manual handling. - Heavy load will be carried with 2 workers - Others heavy loads will be carried by crane / machinery	Foreman Workers	1	2	15	30	(2) Low Risk
2		Falling sliding material to workers' feet/hands when manual handing	Workers / Equipment	3	2	7	42	(2) Low Risk	- Available with manual handling instructions. - When necessary, as training will be repeated. - Slippery surface of the material will be cleaned - Materials will be moved by using glove	Foreman Workers	1	1	7	7	(1) Negligible Risk
3		Hand contact with sharp surfaces	Workers	3	2	7	42	(2) Low Risk	Gloves will be used, when sharp material's transporting	Foreman HSER	1	1	7	7	(1) Negligible Risk
4	Mobilization - Transport / Lifting	Fall on workers, during the lifting of iron and steel rope	Workers / Equipment	1	2	40	80	(2) Low Risk	-A signalman communicate with operator during the activity - The installation process will be carried out under the observation of foreman. - Slings and lifting machines will be control periodically. -Iron bars will not be removed from the iron bonds. Removing the top 5-10 cm, chocks will put under iron bars. The lifting operation will be performed.	Foreman Operator Rigger HSER	0.5	1	40	20	(1) Negligible Risk
5		High of falling material harm to workers	Workers	1	10	7	70	(2) Low Risk	- Activities of the danger will be described in toolbox training - All materials should be checked after maintenance/repair	Maintenance Workers HSER	1	1	7	7	(1) Negligible Risk

6		Huge material / equipment falls on workers	Workers / Equipment	1	3	40	120	(3) Considerable Risk	-A signalman communicate with operator during the activity, - Lifting equipment and apparatus will be carried out by Chamber of Mechanical Engineers. - Lifting equipment will be checked periodically. (Machinery, ropes, slings, etc.).	Foreman Workers HSER	1	1	40	40	(2) Low Risk
7		Small material / equipment falls on workers	Workers / Equipment	1	10	7	70	(2) Low Risk	- All equipment's side and outside will be checked, before lifting - Unauthorized workers will not be in the lifting area	Foreman Workers HSER	1	1	15	15	(1) Negligible Risk
8		Wrong loading	Workers / Equipment	6	2	15	180	(3) Considerable Risk	- Boom of machine will be at least. - A supervisor will control load.	Foreman Workers HSER	1	2	15	30	(2) Low Risk
9		Lack of route	Workers / Equipment	1	3	40	120	(3) Considerable Risk	- The route will be defined before transportation. - All related personnel will inform about transportation and route.	Foreman Workers HSER	1	1	40	40	(2) Low Risk
10		Transportation without escort cars	Workers / Equipment	1	3	40	120	(3) Considerable Risk	- Guidance will be provided by supervisors and HSE. - The trailer will be stopped in potential danger. Controlled access will be provided. - If the way will be closed, A banksman will be at the closed way.	Foreman Workers HSER	1	1	40	40	(2) Low Risk
11	Mobilization - Machine installation	The crane's / machine's boom falls on workers	Workers / Equipment	1	2	40	80	(2) Low Risk	-Observations will be made during the winding rope. - Competent and certified operators will be used. - Periodical inspections shall be carried out according to current Turkish regulations and legislations.	Foreman Workers HSER	1	1	40	40	(2) Low Risk
12		The material falls on workers	Workers / Equipment	1	6	15	90	(2) Low Risk	- All equipment's side and outside will be checked, before lifting- Unauthorized workers will not be in the lifting area-All loads will be removed at least 2 points - Training and toolbox talk in lifting works	Site Engineer Foreman Workers	1	1	15	15	(1) Negligible Risk

13		Falling workers	Workers	1	3	15	45	(2) Low Risk	- Training and tool-box talk on danger of falling high - Workers will be used parachute-type safety belt, worked at high	Site Engineer Foreman Workers	1	1	15	15	(1) Negligible Risk
14		Exposure to hydraulic oil	Workers	1	10	7	70	(2) Low Risk	- Hydraulic hose connections will be checked. - Appropriate PPE will be used (safety goggles, mask, etc.)	Foreman Workers HSER	1	1	7	7	(1) Negligible Risk
15	Piling Works - Machinery	Use of heavy machinery	Workers / Equipment	1	3	15	45	(2) Low Risk	-Operators will have the certificate. - The periodic checks of the machines will be done by accredited company. - Voice alert/ warning device will be on each heavy machinery	Site Engineer Foreman Operator	1	3	15	45	(2) Low Risk
16		Overhead /Underground Services (pipelines)	Workers Equipment	1	3	40	120	(3) Considerable Risk	Client / Consultant will provide full details of all surrounding overhead / underground services. Any necessary permit will be obtained by Authorities/Client, before commencing drilling works a safe distance will be maintained around overhead services as specified by the local authorities. Necessary signboards will be placed to make aware of operatives working close to overhead and underground services.	PM Site Engineer HSER	0.5	3	40	60	(2) Low Risk
17		Bored pile drilling harm to employees when it empties material.	Workers Equipment	1	1	15	15	(1) Negligible Risk	-Heavy machinery will be used by adequate and certified operators. - Movement suddenly of machinery/equipment is prohibited. - All heavy machinery will have warning signs and audio movement alarm.	Foreman Operator	1	0.5	15	7.5	(1) Negligible Risk
18		To splash material when drilling machinery working	Workers	1	10	7	70	(2) Low Risk	- During drilling machine operations, workers will be away from operations area. - If necessary to be near machine, workers will contact with the operators, will approach from the front of the machine. "	Foreman Site Engineer HSER	1	6	7	42	(2) Low Risk
19	Piling Works - Preparation Cage	Workers' working positions during the preparation of cage	Workers	3	10	7	210	(3) Considerable Risk	- Training to employee about ensure correct positioning and alignment (desk/platform, stools, etc.) by subcontractors.	Foreman Site Engineer	1	10	7	70	(2) Low Risk

20		Muscular injury from manual lifting of drilling tools or other materials	Workers	1	6	15	90	(2) Low Risk	- To minimize muscular injuries where necessary lifting devices such as cranes, shovels, trolleys and pulleys will be used by personnel to limit the amount of manual lifting required. - Personnel will be trained on proper manual handling techniques and will be continuously monitored. - No lone workers shall be allowed on site. -Daily toolbox talk and frequent training shall be carried out by HSE Supervisor	Foreman Site Engineer	0.5	6	15	45	(2) Low Risk
21		During the preparation of cage to harm workers' fingers/hands	Workers	1	3	15	45	(2) Low Risk	- Training and tool-box talk on protection fingers/hand - Appropriate PPE will be used (safety gloves etc.)	Foreman Site Engineer	1	2	15	30	(2) Low Risk
22		Falling material from top of the cage when preparation/lifting of cage	Workers	1	2	7	14	(1) Negligible Risk	- Cage will be placement to wells after visually inspected. - All workers will use PPE.	Foreman Site Engineer	1	1	15	15	(1) Negligible Risk
23	Piling Works - Lifting / Placement of cage	Lifting of cage	Workers Equipment	1	6	40	240	(3) Considerable Risk	-Operators will have the certificate. - Guide ropes will be used against free oscillation of cage - Lifting plan will be prepared. The plan will scope lifting, transporting and placement.	Foreman, Operator	1	1	40	40	(2) Low Risk
24		Falling cage when it is lifting or placement	Workers Equipment	1	6	40	240	(3) Considerable Risk	-All lifting equipment will be certified. -Periodical inspections shall be carried out according to current Turkish regulations and legislations. -Lifting equipment and slings will be checked before each lifting operation -Appropriate equipment will be used to load	Site Engineer Foreman	1	1	40	40	(2) Low Risk

25		Placement of cage to well	Workers	1	6	40	240	(3) Considerable Risk	- When cage set down to well in the casing pipe, workers will be careful not to jam their limbs between cage and casing pipe. - Lifting plan will be prepared. The plan will scope lifting, transporting and placement.- Plastic spacer will be placed when the cage lying down if possible. - Relevant workers will use gloves	Foreman, Operator	1	1	40	40	(2) Low Risk
26		Falling from height	Workers Visitors Environment	1	6	15	90	(2) Low Risk	- Training and tool-box talk on danger of falling high - Workers will be used parachute-type safety belt, worked at high	Site Engineer Foreman HSER	1	6	15	90	(2) Low Risk
27	Piling Works - Drilling pipes	Cleaning the auger/ drilling bucket while insertion and removal cycles	Workers	1	10	15	150	(3) Considerable Risk	- Good communication between operator and rigger/signalman (Visual clearance, walkie-talkie) - Hand signals to be explained during training program and check. These signals are used during operation. - Training on importance of the subject to operator and rigger.	Foreman, Operator	1	10	7	70	(2) Low Risk
28		To lose balance and falling who add/dismantle drilling pipe's pins	Workers	1	3	7	21	(1) Negligible Risk	- Training and tool-box talk on danger of falling high - Workers will use parachute-type safety belt, worked at high	Site Engineer Foreman	1	3	7	21	(1) Negligible Risk
29		To harm body / organs who add/dismantle drilling pipe	Workers	1	10	15	150	(3) Considerable Risk	-Facilitator machinery/equipment will be provided workers to removing/installing drill pipe. - All rotating parts will be protected. - Barricading will be done where necessary -Operators, greaser and rigger will work in coordination.	Site Engineer Foreman	0.5	10	15	75	(2) Low Risk
30		To hit worker / equipment / machine while pulling/setting down drilling pipes	Workers Equipment	1	6	7	42	(2) Low Risk	-All workers use PPE. - A rigger sign to operator during to dismantle / install, set down / removal of the tremie operations.	Foreman, Operator	1	6	7	42	(2) Low Risk

31		To fall well who work in front of the machine or walk around	Workers	1	6	40	240	(3) Considerable Risk	-Toolbox talk will be given to starting jobs-Workers won't be near the well, during drilling. Pile wells will be closed with the strong grid, then depth will be measure.- Hard barriers shall be located around all wells.- Over and around the pile wells will be closed against falls. Warning signals will be placed.	Site Engineer Foreman	0.5	3	40	60	(2) Low Risk
32		Wells / excavation pit	Workers Visitors	1	6	40	240	(3) Considerable Risk	- Workers won't be near the wells -Before measurement, each well will be covered with adequate size and strength grid -Excavations will be surrounded with safety fences to avoid falling. And signals will be placed.	Site Engineer Foreman	1	1	40	40	(2) Low Risk
33	Piling Works - Impact Hammer	Hammer drop during pile driving	Workers Equipment	1	6	40	240	(3) Considerable Risk	- All lifting equipment and accessories shall be certified - Inspect lifting slings at least once a week/Reject abraded or corroded slings - The load shall never be lifted before giving signal. Review operating signals prior to commencing the work - Make everyone aware of the sudden penetration of steel pile after first drop of hammer due to weak soil condition -Employees and machinery equipment will be sufficiently far from the work area -Safety wire rope will be used	Site Engineer Foreman Operators	1	6	15	90	(2) Low Risk
34	Piling Works - Concrete	Exposure to chemicals during concreting	Workers	1	6	15	90	(2) Low Risk	- Workers will use safety goggles and other PPE during concreting.	Site Engineer Foreman	0.5	6	15	45	(2) Low Risk
35		Tremie pipes to hit machinery / equipment or workers	Workers Equipment	1	6	15	90	(2) Low Risk	- A special tremie pipe stand will be used for storage and handling of tremie strings. - A rigger sign to operator during to dismantle / install, set down / removal of the tremie operations.	Site Engineer Foreman	1	6	7	42	(2) Low Risk

36		Concrete splash	Workers	1	6	7	42	(2) Low Risk	-Workers will use safety goggles during concreting. -Training to pump operator -Concrete pump will not be passed over workers. - MSDS will be provided and workers will be trained regarding with their contents.	Site Engineer Foreman	1	6	7	42	(2) Low Risk
37		Pump tubing of whipping or breaking	Workers	1	6	15	90	(2) Low Risk	-Safety chain will be at pump's hose connection -Avoid sudden movements, during concreting	Site Engineer Foreman	1	6	15	90	(2) Low Risk
38	Piling Works - General work of bored pile	Missing or incorrect equipment and work platforms to cause the machine to crash	Workers Equipment	0.5	1	40	20	(1) Negligible Risk	-Operators will be always control working platform availability. -Not to work inappropriate places.	Project Manager Site Engineer Foreman Operator	0.5	1	40	20	(1) Negligible Risk
39		Lubricates the surface of the drilling excavation	Workers	1	10	7	70	(2) Low Risk	- Surface will be cleaned from lubricant materials	Site Engineer Foreman	1	3	7	21	(1) Negligible Risk
40		Falling boom or breaking steel ropes/slings	Workers Equipment	1	1	40	40	(2) Low Risk	-The machine is controlled with a daily checklist machine by operators.Non-conformities are marked in this form and machinery cannot start working without fixed problems. Machine maintenance is done regularly.	Site Engineer Foreman HSER	0.5	1	40	20	(1) Negligible Risk
41		Falling pin, bolted or nut out of the machine	Workers Equipment	1	1	40	40	(2) Low Risk	'- Every shift, all machine components will be checked at the beginning, and note to check form. Nobody will be near 4m machine while working. Use all necessary PPE.	Site Engineer Foreman	1	2	40	80	(2) Low Risk
42		Oil spill	Workers Equipment Environment	1	6	15	90	(2) Low Risk	- Machine's hydraulic hose canvas wraps around the Machine's hydraulic hose. Deformation will be monitored.	Foreman, Operator	1	3	15	45	(2) Low Risk

43		Trapped between the machine and the manufacturing equipment	Workers	3	3	15	135	(3) Considerable Risk	- Training on ' Bored Pile HSE Instructions' to workers and they will work according to the instructions - Machines will use by competence and licenced workers. -Equipment cannot be put to the machine's return distance. Not to be other operation in this area - Working in front of the machine to be in active communication with the operator	PM Site Engineer Foreman	1	3	15	45	(2) Low Risk
44	Piling Works - Working at high	Falling worker from top of the machine while climbing to the machine highest point with muddy boots.	Workers	1	3	15	45	(2) Low Risk	-Anyone will climb to the highest point. To reach highest point by the basket.	Site Engineer Foreman	1	3	15	45	(2) Low Risk
45		Falling from tremie basket / man basket	Workers	1	10	7	70	(2) Low Risk	Railings are available in the tremie basket	Site Engineer Foreman	1	6	7	42	(2) Low Risk
46		Falling when repairman repairing machine at high	Workers	1	3	40	120	(3) Considerable Risk	Man basket should be used and will be fitted with seat belts.	Site Engineer Foreman	0.5	3	40	60	(2) Low Risk
47		Falling material from man basket	Workers Equipment	3	2	15	90	(2) Low Risk	-If man basket is used, man basket shall be certificated by Chamber of mechanical Engineers or authorized third party company.- Man basket will have barrier and toe board accordance with the legislation.	Site Engineer Foreman	1	3	15	45	(2) Low Risk
48	Piling Works - Excavated Material	Trip / fall	Workers	1	10	7	70	(2) Low Risk	- Excavated material will be storage at defined storage area in site. -Barricades will be placed around the storage area where necessary.	Foreman Operator Workers	1	6	7	42	(2) Low Risk
49		Puddle / Slush	Workers Equipment	1	6	15	90	(2) Low Risk	- A sump pit will be created if necessary. - Water will be evacuated by water pump from the pit to defined location.	Site Engineer Foreman Workers	1	3	15	45	(2) Low Risk
50		Unsuitable Storage	Workers	1	10	7	70	(2) Low Risk	- Ground condition to be check all time. - To arrange safe storage area within the site- Safe slope of the excavated material	Site Engineer Foreman Operator	1	6	7	42	(2) Low Risk

51	Electric	Electric Panels	Workers	1	3	40	120	(3) Considerable Risk	-He will be competent person and has a competency certificate. - All electrical panels will be locked. Electrician will only have keys. -All Switchboards and panels will be protected using ELCB's (Earth Leakage circuit breakers) -Warning signs and authorized electrician's contact information will be placed in electrical panels. - Insulating material (such as mats) will be placed in front of the all electrical panels - Powder and CO2 extinguishers must be placed in the vicinity of electrical installation.	Foreman Electrician	1	2	40	80	(2) Low Risk
52		Electric (power) lines	Workers	1	6	40	240	(3) Considerable Risk	- All electrical wires, located on or by the walkway, will be protected. - All electrical lines will be embedded in the ground at construction machinery operation area. -Power lines will not pass through walkways, if possible. Cables must remain raised from ground level and clear of liquid material. Cables that must run underground should be placed no less than 1m underground clearly marked with tiles or warning sheets. - Quintet system will be used in the all6electrical cables (3 phases, 1 neutral, 1 ground)	Foreman Electrician	1	2	40	80	(2) Low Risk
53		Power tools and Equipment	Workers Equipment	1	6	15	90	(2) Low Risk	- Periodically, all electrical hand tools will be checked by an authorized electrician and would be wrapped according to the color code. - Inappropriate power tools and equipment will be notified to an authorized electrician (or site engineer /HSER) - All electrical equipment and tools should either be housed or stored away from contact with dust, water or other contaminants.	Foreman Electrician	1	3	15	45	(2) Low Risk

54	Hot Works	Grinding - Cutting Process	Workers	1	6	40	240	(3) Considerable Risk	- Protection of cutting tools will always be on the cutting tools. -Cutting staff will always wear safety glasses. - Training about using PPE.	Foreman Welder	1	2	40	80	(2) Low Risk
55		Welding Cutting - Grinding works	Workers Equipment	1	6	15	90	(2) Low Risk	- All flammable / explosive material will be removed in the environment, before beginning the welding process. -Welders will have welder certificate. -Flash back arrestors on each gas line must be provided and hoses conditions to be checked. - Kept required quantity and grade fire extinguisher - Training and tool-box in hot works (cutting, welding, Grinding) - Welders will use PPE (fireproof apron and gloves, welder's goggles, etc.) -Welding to take place in open air if possible.	Foreman Welder	1	3	15	45	(2) Low Risk
56	Ancillary works	Accident rental machinery / don't be able to his job properly	Workers Equipment	1	3	15	45	(2) Low Risk	- Rental of all equipment's maintenance cards, periodic inspection and operators' licence should be monitored and checked	Operators Foreman Site Engineer	1	3	15	45	(2) Low Risk
57		Diesel, petrol, oil depots and filling / emptying (Flashing)	Workers	1	3	100	300	(4) Serious Risk	- Required warning signals will be placed on / near diesel tanks/trucks - Training in filling and flashing - Kept required quantity and grade fire extinguisher	Foreman Workers Site Engineer	0.5	1	100	50	(2) Low Risk
58		Touch oxygen cylinder with oil/grease (explosion)	Workers Equipment	1	6	40	240	(3) Considerable Risk	-Required warning signals will be placed above storage area of the tubes and tube carrying device	Foreman Welder Workers	0.5	1	40	20	(1) Negligible Risk
59		Visitors' injury	Visitors	1	2	40	80	(2) Low Risk	- Training in hazards of project / work area to visitors. -Visitors will use necessary PPE (Helmets, goggles, shoes, boots etc.)	PM HSER Site Engineer Visitors	1	1	15	15	(1) Negligible Risk

60	Piling Works – Polymer Usage	Exposure to polymer mixture	Workers	0.5	1	40	20	(1) Negligible Risk	- Use all necessary PPE.	Foreman Operator Workers	0.5	1	40	20	(1) Negligible Risk
61		Leakage to sea	Environment	0.5	1	40	20	(1) Negligible Risk	-Environmentally friendly product	Project Manager Site Engineer Foreman Operator	0.5	1	40	20	(1) Negligible Risk
62		Much load on shoulder, during small material/equipment manual handling	Workers	3	2	15	90	(2) Low Risk	- More than 25 kg heavy load doesn't manual handling. - Heavy load will be carried with 2 workers - Others heavy loads will be carried by crane / machinery	Foreman Workers	1	2	15	30	(2) Low Risk
63		Collapse in the drilling borehole	Execution	3	2	15	90	(2) Low Risk	- Casing will be used.	Project Manager Site Engineer Foreman Operator	1	2	15	30	(2) Low Risk

9.4 Machinery Catalogue

As technology continues to improve, we are unable to inform you of the change of our products in time. We apologize for any inconvenience caused!

March 2020

XCMG

XCMG FOR YOUR SUCCESS

XCMG

XCMG FOUNDATION CONSTRUCTION MACHINERY BUSINESS DIVISION

Address: No.36 Tuolanshan Road, Jinshanqiao Developing Zone, Xuzhou, Jiangsu, China

Sales and Service Hotline: +86 400-110-9999

Postcode: 221004

www.xcmg.com/xgjc/

XCMG FOUNDATION CONSTRUCTION MACHINERY BUSINESS DIVISION

Highlights Introduction

XR360E rotary drilling rig is a large tonnage product of new generation E series which increases the power and system flow on the basis of mature XR360 to improve working efficiency. It is widely used in the hole-forming operations of cast-in-place concrete piles in the construction of roads, railways, bridges, large venues and other projects, and it is especially suitable for industrial and civil buildings. It adopts mechanical interlocking or friction Kelly bars to work with rotary buckets such as sand drilling bucket, tubular drill and short spiral drill. It can also carry CFA or dual rotary drive for construction.

01

As a multifunctional machine, XR360E can realize quick function switching such as crowd cylinder, crowd winch, CFA and dual rotary drive to meet different construction needs.

02

The multi-gear rotary drive and main winch with single-rope can improve the working performance by 20% and ensure higher working efficiency.

03

The intelligent control system can realize functions such as automatic adjustment and display of mast perpendicularity, automatic rotation, spin-off, lifting & concrete pouring and pile type display, etc. The bus panel design is adopted to prevent misoperation.

04

It adopts H-form hydraulic retractable crawler chassis dedicated for rotary drilling rigs and large diameter slewing bearing, which ensures super stability and transportation convenience.

05

Optimally designed double jib luffing mechanism and optimized hinge point position can ensure construction stability and transportation convenience.

06

The main and auxiliary winches both adopt single-rope technology. The service life of the wire rope is 2~4 times longer than that of the multi-row rope and the cost is lower.

07

The hydraulic system adopts load sensing technology and unites total power control and limit power control technologies, making the hydraulic system more efficient and energy-saving. It adopts independent radiator system with compact structure and high heat dissipation efficiency.

08

It adopts Volvo electronically controlled turbocharged engine with more power and lower fuel consumption.

P01

P02

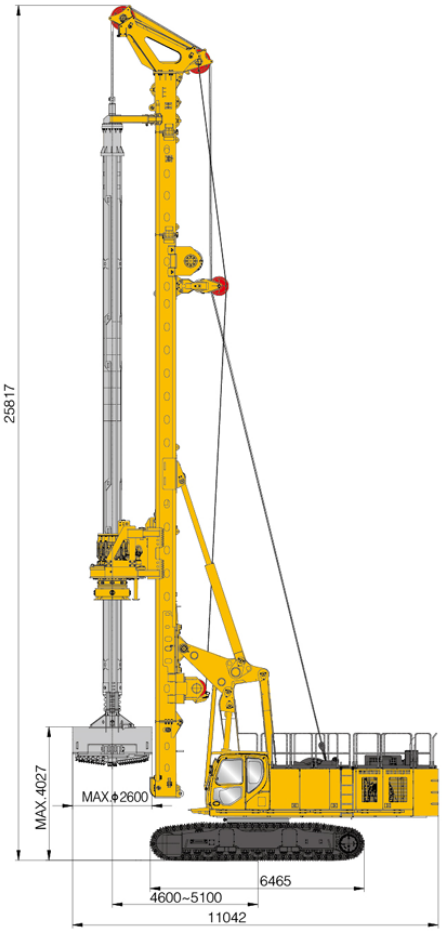
Dimension & Configuration

Standard

- Self-righting
- Rotation angle display
- Rotation sound-light alarm
- Security monitoring of the tail
- Luffing limit protection
- Mast limit (front and back, left and right)
- Manual/automatic adjustment of mast perpendicularity
- Mast perpendicularity detection
- Cathead cylinder
- Display of rotary drive torque
- Display of rotary drive speed
- Rock-entering mode of rotary drive
- Automatic forward & reverse spin-off
- Casing driving
- Crowd cylinder
- Fuel self-priming pump
- Main winch floating
- Main winch height limit
- Main winch infrared monitoring
- Real-time detection of drilling depth
- Main winch lifting force detection
- Gradienter
- Radio
- Air conditioner
- Oil pressure detection
- Intelligent fault detection
- Filter clogging alarm
- Scram protection
- PLC intelligent control module
- Central lubrication

Optional

- High-speed spin-off
- Crowd winch
- Torque multiplier



P03

Main Technical Parameters

Working height	27.5 m	90 ft
Overall operating weight (standard)	115 t (without drilling tools)	126.7 ton(US)
Max. drilling diameter	Φ2600 mm/φ2300 mm*	102.4 in/90.6 in*
Max. drilling depth	103 m	338 ft
Dimensions		
Working condition	10870×4900×25820 mm	428×193×1017 in
Transport condition	20650×3500×3845 mm	813×138×152 in
Engine	TAD1353VE	TAD1352VE
Rated power	345 kW/1900 r/min	462 hp/1900 rpm
Emission standard	EU Ⅲ	EU Ⅲ
Fuel tank capacity	800 L	211.3 US gal
Rotary drive		
Rated output torque	360 kNm	265348 lbf*ft
Rotary speed	6-27 r/min	6-27 rpm
Crowd cylinder		
Max. crowd force push/pull	300 kN/350 kN	67443 lbf/78684 lbf
Max. stroke	6 m	20 ft
Crowd winch (optional)		
Max. crowd force push/pull	300 kN/350 kN	74187 lbf/78684 lbf
Max. stroke	10 m/16 m	33 ft/53 ft
Main winch		
Max. pulling force	370 kN	83180 lbf
Max. line speed	60 m/min	197 ft/min
Auxiliary winch		
Max. pulling force	100 kN	22481 lbf
Max. line speed	41 m/min	134 ft/min
Mast inclination		
Lateral/forward/backward	±4°/5°/15°	±4°/5°/15°
Undercarriage		
Max. travel speed of overall unit	1.6 km/h	1.0 mph
Min. ground clearance	450 mm	17.7 in
Width of triple grouser track shoes	800 mm	31.5 in
Width of crawlers retracted/extended	3500-4900 mm	138 -193 in
Max. climbable gradient of overall unit	35%	35%
Ground pressure	125 kPa	18 psi
Hydraulic system		
Hydraulic oil tank capacity	1000 L	264.2 US gal
Working pressure	33 MPa	4786 psi

Note: Parameters with "*" refer to the ones of crowd winch configuration.

P04

TEREX LIFTING

AMERICAN HC 80
Hydraulic Crawler Crane

FEATURES

- **80 tons (73 mt) max lift capacity**
- **200 ft. (61 m) max lift crane boom length**
- **170+60 ft. (52+18 m) max lift crane boom & jib length**
- **240 ft. (73 m) max boom & luffing jib length**
- Power up/down and freefall on main, auxiliary and optional third drum
- 32,400 lbs. (14 700 kg) max single line pull, 530 fpm (161 mpm) max line speed
- Quiet, comfortable operator's cab with excellent viewing range
- Shockless stop system gradually retards operating speed to reduce shocks when crane approaches lifting load or boom limits
- Two speed travel allows operator to select the best speed and power control for any condition
- Superior transportability:
  11 ft. 9.75 in. (3.6 m) width
  10 ft. 2 in. (3.09 m) height
- 88,000 lbs. (39 917 kg) transport weight including sideframes and boom inner
- Hydraulic counterweight removal system simplifies installation and removal

simple, available and cost effective™

Machines shown may have optional equipment.

AMERICAN HC 80

Hydraulic Crawler Crane

Max. Lifting Capacity:
80 tons (73 mt)

Environmental operator's cab

Hydraulic removable counterweight system

200 ft. (61 m) MAXIMUM LIFT CRANE BOOM

- 47HI tubular chord boom, pin connected.
- 20 ft. (12.4 m) inner and outer and 10/20 /30 ft. (3/6/9 m) available inserts provide boom compositions in 10 ft. (3 m) increments from 40 ft. (12.2 m) to 200 ft. (61 m).

ROBUST ENGINE

- 197 BHP @2100 RPM Cummins 6BTA5.9 turbocharged aftercooled diesel engine, 4 cycle, 6 cylinders. Fuel tank capacity is 60 gal. (227 l).

ENVIRONMENTAL OPERATOR'S CAB

- Designed to provide excellent viewing range and quiet, comfortable operation.
- 37 in. (.91 m) wide cab has wide curved windows on both top and bottom.
- Easy-to-operate modular and ergonomically designed controls reduce operator fatigue and increase productivity.
- Load Moment Indicator with interactive screen. Operator can select from three display modes: loaded condition diagram, rated lifting curve, rated lifting load table, and features a shockless stop system to reduce shocks.
- Adjustable operator's seat, radio, air conditioner, overhead window, sun visor, fan, overhead and front wipers, and drum rotation indicators standard.

HEAVY DUTY CARBODY AND CRAWLERS

- Fabricated steel carbody is deep box constructed with square axles for the crawler side frames. Precision machined top supports anti-friction swing circle and multiple pass hydraulic swivel joint.
- Crawlers have high alloy steel tumbler yokes and rigid fabricated structures with sealed rollers.
- 36" (914 mm) crawler shoes.
- Travel mechanism is set within shoe width.
- Side frames extended or retracted by cylinders inside the carbody.
- Two travel speed settings – .8/1.24 mph (1.3/2.0 km/h).
- 40% (22°) gradeability.

POWERFUL, HIGH-SPEED HOIST SYSTEM

- Identical inline, independent main and auxiliary load hoisting drums are grooved for 7/8 in. (22.4 mm) diameter rope. Line speed is 530 fpm (162 m/min), line pull, 32,400 lbs. (14 697 kg).
- Each drum, including optional third, has power up/down and freefall. Load hoists are further controllable in stepless mode.
- Ample work space in front of drums allows easy access for cable installation and maintenance.
- External contracting brake.
- Internal expanding band clutch.
- 3.3 rpm swing speed.

HIGH CAPACITY, DEPENDABLE HYDRAULIC SYSTEM

- Open circuit system has 2 variable displacement piston pumps with system capacity of 116 gpm (440 lpm)
- Hydraulic reservoir with 79 gal. (300 l) capacity and 10 micron filtration.
- Component working range is between -4 and 203° F (-20 and 95° C).
- Flip up doors provide easy access to engine and hydraulic components for service.

THREE PIECE REMOVABLE COUNTERWEIGHT

- Three piece pin connected counterweight can be assembled or disassembled easily within minutes.
- Hydraulic counterweight removal system is standard and utilizes the "A" frame and crane auxiliary drum to make the HC 80 one of the most transportable cranes in its class.
- Moves on three trucks with full boom and #9HL jib. Carbody sideframes and boom weigh in at under 88,000 lbs. (39 917 kg). At 11 ft. 9.75 in. (3.6 m) wide and 10 ft. 2 in. (3.09 m) high, the HC 80 at working weight will transport on a standard lowboy trailer.

OPTIONS INCLUDE:

- Third drum.
- Automotive type lights.
- Hydraulic power take off.
- Jib and jib inserts.
- Luffing jib attachment.
- 46HI angle boom.
- Single sheave extension.

For more information, product demonstration, or details on purchase, lease and rental plans, please contact your local Terex Cranes Distributor.

We reserve the right to amend these specifications at any time without notice. The only warranty applicable is our standard written warranty applicable to the particular product and sale. We make no other warranty, expressed or implied.

TEREX CRANES

AMERICAN CRANE CORPORATION
202 Raleigh Street
Wilmington, NC 28412 USA
(910) 395-8500 • FAX: (910) 395-8538
E-mail: american@american-crane.com

www.terexlift.com

TAC-002 ©Terex Cranes, Inc. 2002 Litho in U.S.A. 5J101S65

TEREX LIFTING

AMERICAN HC 80

Hydraulic Crawler Crane
47 HI Boom

LIFT RATINGS IN POUNDS

With 47HI Offset Tip Boom and 58,100 Pound Counterweight

Boom	Radius (Feet)	Boom Angle (Degrees)	Side Frames Extended (Pounds)	From Boom Pt. to Ground (Feet)
40' (12.2M)	11	80.5	160,000 *	45
	12	79.0	160,000 *	45
	15	74.6	141,480	44
	20	67.0	87,810	42
	25	58.8	63,360	40
	30	49.9	49,350	36
	35	39.5	40,320	31
	40	25.8	33,970	23
50' (15.2M)	13	80.1	160,000 *	55
	15	77.8	141,440	54
	20	71.8	87,750	53
	25	65.6	63,280	51
	30	59.1	49,250	48
	35	52.0	40,220	45
	40	44.2	33,860	40
	50	22.9	25,540	25
60' (18.3M)	14	80.8	145,370 *	65
	15	79.8	141,380	64
	20	74.9	87,660	63
	25	69.9	63,170	62
	30	64.7	49,120	60
	35	59.2	40,100	57
	40	53.4	33,730	54
	50	40.2	25,400	44
	60	20.8	20,230	27
70' (21.3M)	16	80.5	125,040 *	74
	20	77.1	87,590	74
	25	72.9	63,090	72
	30	68.5	49,040	71
	35	64.0	40,020	68
	40	59.3	33,640	66
	50	49.2	25,310	58
	60	37.0	20,150	48
	70	19.2	16,580	28
80' (24.4M)	17	80.9	109,250 *	84
	20	78.8	87,470	84
	25	75.1	62,960	83
	30	71.3	48,880	81
	35	67.5	39,870	79
	40	63.5	33,480	77
	50	55.1	25,140	71
	60	45.8	20,000	63
	70	34.5	16,430	51
	80	17.9	13,830	30
90' (27.4M)	19	80.7	94,540	94
	20	80.0	87,330	94
	25	76.8	62,810	93
	30	73.5	48,720	92
	35	70.1	39,720	90
	40	66.7	33,320	88
	50	59.5	24,970	83
	60	51.7	19,840	76
	70	43.0	16,260	67
	80	32.5	13,660	54
	90	16.9	11,690	32
100' (30.5M)	21	80.4	80,910	104
	25	78.1	62,690	103
	30	75.2	48,580	102
	35	72.2	39,590	101
	40	69.1	33,190	99
	50	62.8	24,840	94
	60	56.1	19,720	88
	70	48.9	16,130	81
	80	40.7	13,540	71
	90	30.7	11,560	56
	100	16.0	10,010	33
110' (33.5M)	22	80.8	72,040 *	114
	25	79.2	62,530	113
	30	76.5	48,420	112
	35	73.8	39,430	111
	40	71.1	33,020	109
	50	65.5	24,650	105
	60	59.6	19,560	100
	70	53.3	15,970	94
	80	46.4	13,360	85
	90	38.7	11,380	74
	100	29.2	9,840	59
	110	15.2	8,590	34
120' (36.6M)	24	80.6	60,160 *	124
	25	80.1	60,160 *	124
	30	77.7	48,260	123
	35	75.2	39,260	121
	40	72.7	32,850	120
	50	67.6	24,470	116
	60	62.3	19,390	112
	70	56.8	15,800	106
	80	50.8	13,190	98
	90	44.3	11,210	89
	100	37.0	9,660	78
	110	28.0	8,410	62
	120	14.5	7,390	36
130' (39.6M)	25	80.9	50,970 *	134
	30	78.6	48,100	133
	35	76.4	39,120	132
	40	74.1	32,700	130
	50	69.4	24,320	127
	60	64.7	19,240	123
	70	59.6	15,650	118
	80	54.4	13,040	111
	90	48.7	11,060	103
	100	42.5	9,510	93
	110	35.4	8,250	81
	120	26.8	7,230	64
	130	13.9	6,380	37
140' (42.7M)	27	80.7	42,380 *	144
	30	79.5	42,370 *	143
	35	77.4	38,950	142
	40	75.3	32,530	141
	50	71.0	24,140	138
	60	66.6	19,070	134
	70	62.0	15,480	129
140' (42.7M)	80	57.3	12,860	123
	90	52.2	10,880	116
	100	46.8	9,330	108
	110	40.9	8,070	97
	120	34.1	7,040	84
	130	25.8	6,180	66
	140	13.4	5,470	38
150' (45.7M)	28	80.9	36,630 *	154
	30	80.2	36,540 *	153
	35	78.2	36,070 *	152
	40	76.3	32,360	151
	50	72.3	23,960	148
	60	68.2	18,900	145
	70	64.0	15,310	140
	80	59.7	12,690	135
	90	55.1	10,710	128
	100	50.3	9,150	121
	110	45.1	7,890	112
	120	39.4	6,860	101
	130	32.9	6,000	87
	140	24.9	5,270	69
	150	12.9	4,650	39
160' (48.8M)	30	80.8	31,770 *	163
	35	79.0	31,370 *	162
	40	77.1	30,790 *	161
	50	73.4	23,800	159
	60	69.7	18,750	155
	70	65.8	15,150	151
	80	61.8	12,530	146
	90	57.6	10,550	141
	100	53.2	8,990	134
	110	48.6	7,730	125
	120	43.6	6,690	116
	130	38.1	5,830	104
	140	31.8	5,100	90
	150	24.1	4,480	71
	160	12.5	3,950	40
170' (51.8M)	31	81.0	27,710 *	173
	35	79.6	27,340 *	173
	40	77.9	26,810 *	172
	50	74.4	23,610	169
	60	70.9	18,580	166
	70	67.3	14,980	162
	80	63.6	12,360	158
	90	59.7	10,360	152
	100	55.7	8,800	146
	110	51.5	7,540	139
	120	47.1	6,510	130
	130	42.2	5,650	120
	140	36.9	4,920	108
	150	30.8	4,290	93
	160	23.4	3,750	73
	170	12.1	3,290	41
180' (54.9M)	33	80.9	24,240 *	183
	35	80.2	24,110 *	183
	40	78.6	23,210 *	182

Form No. HC-80-CR-47HI3

LIFT RATINGS IN POUNDS (continued)

With 47HI Offset Tip Boom and 58,100 Pound Counterweight

Boom	Radius (Feet)	Boom Angle (Degrees)	Side Frames Extended (Pounds)	From Boom Pt. to Ground (Feet)
180' (54.9M)	50	75.3	20,080 *	180
	60	72.0	18,410	177
	70	68.6	14,800	173
	80	65.1	12,180	169
	90	61.6	10,190	164
	100	57.9	8,630	158
	110	54.0	7,360	151
	120	50.0	6,330	143
	130	45.7	5,460	134
	140	41.0	4,720	123
	150	35.8	4,100	111
	160	29.9	3,550	95
	170	22.7	3,080	75
	180	11.8	2,690	42
190' (57.9M)	35	80.7	19,320 *	193
	40	79.2	18,660 *	192
	50	76.1	17,360 *	190

Boom	Radius (Feet)	Boom Angle (Degrees)	Side Frames Extended (Pounds)	From Boom Pt. to Ground (Feet)
190' (57.9M)	60	73.0	16,110 *	187
	70	69.8	14,640	184
	80	66.5	12,010	180
	90	63.2	10,020	175
	100	59.8	8,460	170
	110	56.2	7,200	163
	120	52.5	6,160	156
	130	48.5	5,290	148
	140	44.4	4,550	138
	150	39.8	3,930	127
	160	34.8	3,390	114
	170	29.1	2,910	98
	180	22.1	2,500	77
	190	11.5	2,150	43
200' (61.0M)	36	80.9	16,750 *	203
	40	79.7	16,230 *	202
	50	76.8	15,000 *	200

Boom	Radius (Feet)	Boom Angle (Degrees)	Side Frames Extended (Pounds)	From Boom Pt. to Ground (Feet)
200' (61.0M)	60	73.8	13,800 *	198
	70	70.8	12,770 *	194
	80	67.8	11,840	191
	90	64.6	9,840	186
	100	61.4	8,270	181
	110	58.1	7,010	175
	120	54.6	5,970	169
	130	51.0	5,100	161
	140	47.2	4,370	152
	150	43.2	3,740	142
	160	38.8	3,190	131
	170	33.9	2,710	117
	180	28.4	2,300	100
	190	21.5	1,940	79
	200	11.2	1,560 *	44

With 47HI Boom, #9HL Jib and 58,100 Pound Counterweight

Boom and Jib Length	Jib Radius (Feet)	5.0 Deg Offset		15.0 Deg Offset		25.0 Deg Offset	
		Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)
40' (12.2M) JIB & 100' (30.5M) BOOM	30	80.7	22,550*				
	35	78.6	22,550*				
	40	76.5	22,270*	79.2	21,040*		
	50	72.2	21,530*	74.9	20,440*	77.5	19,530*
	60	67.9	19,790	70.5	19,790	73.0	19,110*
	70	63.4	16,210	66.0	16,220	68.4	16,220
	80	58.7	13,610	61.2	13,610	63.6	13,620
	90	53.7	11,640	56.2	11,640	58.4	11,650
	100	48.4	10,100	50.8	10,100	52.9	10,100
40' (12.2M) JIB & 110' (33.5M) BOOM	31	80.9	22,530*				
	35	79.3	22,530*				
	40	77.4	22,380*	79.9	21,070*		
	50	73.5	21,690*	76.0	20,550*	78.3	19,620*
	60	69.4	19,590	71.9	19,590	74.2	19,200*
	70	65.3	16,020	67.7	16,020	70.0	16,020
	80	61.0	13,420	63.4	13,420	65.6	13,420
	90	56.5	11,440	58.9	11,440	61.0	11,440
	100	51.7	9,890	54.1	9,890	56.1	9,890
	110	46.6	8,640	48.9	8,640	50.8	8,640
40' (12.2M) JIB & 120' (36.6M) BOOM	33	80.7	22,520*				
	35	80.0	22,520*				
	40	78.2	22,500*	80.6	21,220*		
	50	74.5	21,840*	76.9	20,640*	79.1	19,450*
	60	70.8	19,400	73.1	19,400	75.3	19,290*
	70	66.9	15,820	69.2	15,820	71.4	15,830
	80	62.9	13,220	65.2	13,220	67.3	13,220
	90	58.8	11,240	61.1	11,240	63.1	11,240
	100	54.5	9,690	56.7	9,690	58.7	9,690
	110	49.9	8,440	52.1	8,440	53.9	8,440
	120	45.0	7,410	47.1	7,420	48.8	7,420
40' (12.2M) JIB & 130' (39.6M) BOOM	34	80.9	22,500*				
	35	80.6	22,500*				
	40	78.9	22,500*				
	50	75.4	21,960*	77.7	20,260*	79.8	16,510*
	60	71.9	19,220	74.1	19,220	76.2	16,330*
	70	68.3	15,640	70.5	15,640	72.5	15,640
	80	64.7	13,030	66.8	13,040	68.8	13,040
	90	60.9	11,060	63.0	11,060	64.9	11,070
	100	56.9	9,510	59.0	9,510	60.8	9,520
	110	52.7	8,260	54.8	8,260	56.6	8,270
	120	48.3	7,230	50.4	7,240	52.0	7,240
	130	43.6	6,380	45.5	6,380	47.1	6,380

Boom and Jib Length	Jib Radius (Feet)	5.0 Deg Offset		15.0 Deg Offset		25.0 Deg Offset	
		Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)
40' (12.2M) JIB & 140' (42.7M) BOOM	36	80.8	20,660*				
	40	79.5	20,290*				
	50	76.3	19,360*	78.4	17,140*	80.4	13,940*
	60	73.0	18,380*	75.1	16,530*	77.0	13,730*
	70	69.6	15,440	71.7	15,440	73.6	13,330*
	80	66.2	12,840	68.2	12,840	70.1	12,840
	90	62.6	10,870	64.7	10,870	66.5	10,870
	100	59.0	9,310	61.0	9,320	62.7	9,320
	110	55.1	8,060	57.1	8,070	58.8	8,070
	120	51.1	7,030	53.1	7,040	54.7	7,040
	130	46.9	6,180	48.8	6,180	50.3	6,180
	140	42.3	5,440	44.1	5,440	45.5	5,450
40' (12.2M) JIB & 150' (45.7M) BOOM	37	81.0	17,540*				
	40	80.1	17,270*				
	50	77.0	16,390*	79.0	14,570*	80.9	11,850*
	60	73.9	15,480*	75.9	13,950*	77.7	11,580*
	70	70.7	14,620*	72.7	13,330*	74.5	11,160*
	80	67.5	12,640	69.4	12,640	71.2	10,710*
	90	64.2	10,670	66.1	10,670	67.8	10,200*
	100	60.8	9,120	62.7	9,120	64.4	9,120
	110	57.2	7,870	59.1	7,870	60.7	7,870
	120	53.5	6,840	55.4	6,840	57.0	6,840
	130	49.7	5,970	51.5	5,970	53.0	5,970
	140	45.5	5,240	47.3	5,240	48.7	5,250
	150	41.1	4,620	42.8	4,620	44.1	4,620
40 (12.2M) JIB & 160' (48.8M) BOOM	39	80.9	14,880*				
	40	80.6	14,800*				
	50	77.7	13,940*	79.6	12,410*		
	60	74.7	13,080*	76.6	11,810*	78.4	9,770*
	70	71.7	12,280*	73.6	11,240*	75.3	9,380*
	80	68.7	11,520*	70.5	10,610*	72.2	8,910*
	90	65.6	10,480	67.4	10,000*	69.1	8,440*
	100	62.4	8,930	64.2	8,930	65.8	7,940*
	110	59.1	7,680	60.9	7,680	62.4	7,460*
	120	55.6	6,650	57.4	6,650	58.9	6,650
	130	52.1	5,790	53.8	5,790	55.3	5,790
	140	48.3	5,060	50.0	5,060	51.4	5,070
	150	44.3	4,440	46.0	4,440	47.3	4,440
	160	40.0	3,890	41.6	3,890	42.8	3,900

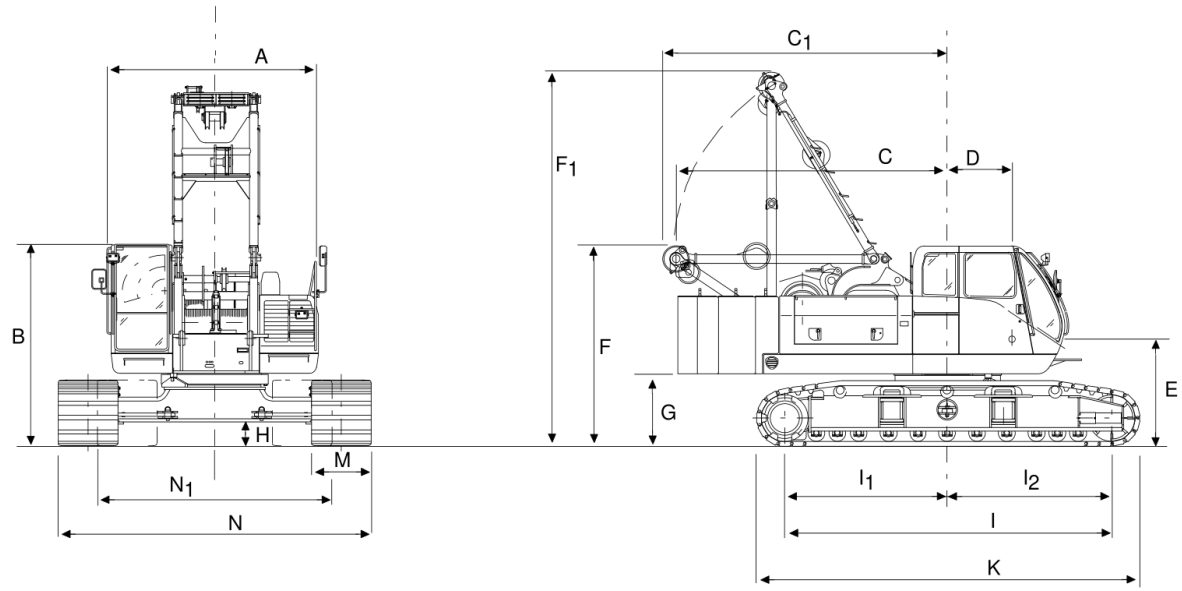
LIFT RATINGS IN POUNDS (continued)

With 47HI Boom, #9HL Jib and 58,100 Pound Counterweight (continued)

Boom and Jib Length	Jib Radius (Feet)	5.0 Deg Offset		15.0 Deg Offset		25.0 Deg Offset	
		Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)
50' (15.2M) JIB & 130' (39.6M) BOOM	37	80.8	21,560*				
	40	79.8	21,560*				
	50	76.5	21,230*	79.2	18,440*		
	60	73.2	19,260	75.9	18,050*	78.3	14,500*
	70	69.9	15,670	72.5	15,670	74.9	14,320*
	80	66.4	13,070	69.0	13,070	71.4	13,070
	90	62.9	11,100	65.5	11,100	67.8	11,100
	100	59.2	9,540	61.8	9,550	64.0	9,550
	110	55.4	8,290	57.9	8,300	60.1	8,300
	120	51.4	7,260	53.8	7,270	55.9	7,270
	130	47.1	6,410	49.5	6,410	51.5	6,410
50' (15.2M) JIB & 140' (42.7M) BOOM	38	80.9	19,100*				
	40	80.3	19,090*				
	50	77.3	18,270*	79.8	15,660*		
	60	74.2	17,330*	76.6	15,230*	79.0	12,250*
	70	71.0	15,480	73.5	14,660*	75.8	12,030*
	80	67.8	12,870	70.2	12,870	72.5	11,660*
	90	64.4	10,890	66.9	10,890	69.1	10,890
	100	61.0	9,340	63.4	9,340	65.6	9,340
	110	57.5	8,090	59.9	8,090	62.0	8,090
	120	53.8	7,060	56.1	7,060	58.2	7,060
	130	49.9	6,200	52.2	6,200	54.2	6,200
	140	45.8	5,470	48.0	5,470	49.9	5,480
50' (15.2M) JIB & 150' (45.7M) BOOM	40	80.8	16,350*				
	50	77.9	15,500*	80.3	13,360*		
	60	75.0	14,620*	77.3	12,930*	79.6	10,360*
	70	72.0	13,810*	74.3	12,350*	76.5	10,130*
	80	68.9	12,680	71.3	11,790*	73.4	9,780*
	90	65.8	10,690	68.1	10,700	70.2	9,390*
	100	62.6	9,140	64.9	9,140	67.0	8,960*
	110	59.3	7,890	61.6	7,890	63.6	7,890
	120	55.9	6,860	58.1	6,860	60.1	6,860
	130	52.3	6,000	54.5	6,000	56.4	6,010
	140	48.5	5,270	50.7	5,270	52.5	5,280
	150	44.5	4,650	46.7	4,650	48.4	4,650
50' (15.2M) JIB & 160' (48.8M) BOOM	41	81.0	13,930*				
	50	78.5	13,220*	80.8	11,420*		
	60	75.7	12,420*	78.0	10,970*	80.1	8,790*
	70	72.9	11,620*	75.1	10,460*	77.2	8,530*
	80	70.0	10,910*	72.2	9,900*	74.3	8,170*
	90	67.0	10,200*	69.2	9,370*	71.3	7,790*
	100	64.0	8,960	66.2	8,830*	68.2	7,370*
	110	60.9	7,710	63.1	7,710	65.0	6,950*
	120	57.7	6,680	59.9	6,680	61.8	6,550*
	130	54.4	5,810	56.5	5,810	58.4	5,820
	140	50.9	5,080	53.0	5,080	54.8	5,090
	150	47.3	4,470	49.3	4,470	51.0	4,470
	160	43.4	3,920	45.4	3,920	47.0	3,930
50' (15.2M) JIB & 170' (51.8M) BOOM	43	80.9	11,760*				
	50	79.0	11,240*				
	60	76.4	10,490*	78.5	9,290*	80.6	7,450*
	70	73.7	9,740*	75.8	8,800*	77.8	7,150*
	80	70.9	9,090*	73.1	8,250*	75.0	6,780*
	90	68.1	8,440*	70.3	7,730*	72.2	6,400*
	100	65.3	7,840*	67.4	7,250*	69.3	6,010*
	110	62.4	7,290*	64.4	6,740*	66.3	5,600*
	120	59.4	6,470	61.4	6,280*	63.2	5,220*
	130	56.3	5,610	58.3	5,620	60.1	4,840*
	140	53.0	4,880	55.1	4,890	56.8	4,450*
	150	49.7	4,260	51.6	4,260	53.3	4,070*
	160	46.1	3,720	48.1	3,720	49.6	3,700*
	170	42.3	3,240	44.2	3,250	45.7	3,250

Boom and Jib Length	Jib Radius (Feet)	5.0 Deg Offset		15.0 Deg Offset		25.0 Deg Offset	
		Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)	Boom Angle	Ratings (Pounds)
60' (18.3M) JIB & 150' (45.7M) BOOM	42	80.9	15,270*				
	50	78.7	14,640*				
	60	75.9	13,810*	78.7	11,900*		
	70	73.1	13,030*	75.8	11,450*	78.3	9,070*
	80	70.2	12,320*	72.9	10,950*	75.4	8,860*
	90	67.3	10,730	69.9	10,420*	72.4	8,540*
	100	64.3	9,160	66.9	9,170	69.3	8,220*
	110	61.2	7,910	63.8	7,910	66.1	7,830*
	120	58.0	6,880	60.6	6,880	62.9	6,890
	130	54.6	6,020	57.2	6,020	59.4	6,030
	140	51.2	5,290	53.7	5,300	55.9	5,300
	150	47.5	4,670	50.0	4,670	52.1	4,670
60' (18.3M) JIB & 160' (48.8M) BOOM	44	80.8	12,930*				
	50	79.3	12,460*				
	60	76.6	11,740*	79.2	10,100*		
	70	73.9	11,020*	76.5	9,660*	78.9	7,700*
	80	71.1	10,310*	73.7	9,200*	76.1	7,440*
	90	68.4	9,670*	70.9	8,730*	73.3	7,110*
	100	65.5	8,990	68.0	8,270*	70.4	6,790*
	110	62.6	7,740	65.1	7,740	67.4	6,440*
	120	59.6	6,700	62.1	6,710	64.3	6,070*
	130	56.5	5,840	58.9	5,850	61.1	5,710*
	140	53.3	5,100	55.7	5,110	57.8	5,110
	150	49.9	4,490	52.3	4,490	54.3	4,490
	160	46.3	3,940	48.7	3,940	50.6	3,950
60' (18.3M) JIB & 170' (51.8M) BOOM	45	81.0	11,020*				
	50	79.7	10,620*				
	60	77.2	9,940*	79.7	8,590*		
	70	74.6	9,250*	77.1	8,170*	79.4	6,460*
	80	72.0	8,600*	74.5	7,710*	76.8	6,190*
	90	69.4	8,020*	71.8	7,230*	74.1	5,870*
	100	66.6	7,430*	69.1	6,790*	71.3	5,530*
	110	63.9	6,910*	66.3	6,340*	68.5	5,190*
	120	61.1	6,400*	63.4	5,920*	65.6	4,850*
	130	58.1	5,640	60.5	5,500*	62.6	4,520*
	140	55.1	4,910	57.5	4,910	59.5	4,180*
	150	52.0	4,280	54.3	4,280	56.3	3,850*
	160	48.7	3,740	51.0	3,740	52.9	3,530*
	170	45.2	3,260	47.5	3,270	49.3	3,190*

AMERICAN MODEL HC 80
GENERAL DIMENSIONS



		FEET	MM
A	Width of machinery cab	10’-5 3/16”	3,180
B	Height over operator’s cab	10’-1 1/14”	3,080
C	Tail swing	13’-8 3/8”	4,175
C_1	Tail swing with A-Frame lowered	14’-5 1/4”	4,400
D	Center rotation to boom foot	3’-3 3/8”	1,000
E	Ground to center of boom foot	5’-5”	1,650
F	Height over A-Frame lowered	10’-1 5/8”	3,090
F_1	Height over A-Frame raised	18’-0 15/16”	5,510
G	Ground to bottom of counterweight	3’-7 7/8”	1,115
H	Minimum ground clearance	1’-2 9/16”	370

		FEET	MM
I	Center to center of crawler tumblers	16’-7 1/4”	5060
I_1	Center of drive tumbler to center of rotation	8’-3 1/4”	2,520
I_2	Center of idler tumbler to center of rotation	8’-4”	2,540
K	Overall length of crawlers	19’-5 7/8”	5,940
M	Width of tread shoe (standard)	36”	915
N	Overall width of crawler Shoes Extended	15’-9”	4,800
N_1	Shoes Retracted	11’-9 3/4”	3,600

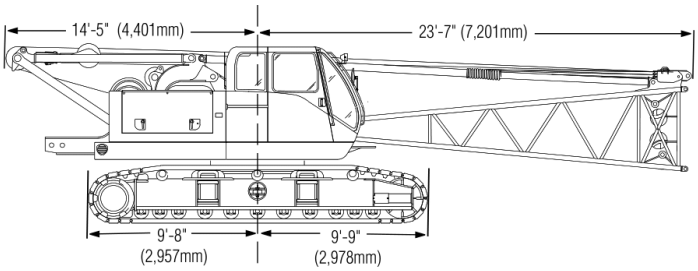
TRANSPORT LOADS - HC 80 MACHINE, 170’ 47HI BOOM AND 60’ #9HL JIB

Load 1	Weight	Load 2*	Weight	Load 3*	Weight
Basic upper Including: Carbody, 47HI Boom Inner & Side Frames	88,000lbs (39,917kg)	47H 30’ Boom Center	2,045lbs (928kg)	Outside Counterweight	21,000lbs (9,526kg)
		Inside Counterweight	16,000lbs (7,258kg)	47HI Boom Outer	2,225lbs (1,009kg)
		47H 30’ Boom Center	2,045lbs (928kg)	47H 30’ Boom Center	2,045lbs (928kg)
		#9HL 20’ Jib Center	385lbs (175kg)	#9HL Jib Inner	890lbs (404kg)
		47H 30’ Boom Center	2,045lbs (928kg)	#9HL Jib Outer	665lbs (303kg)
		Center Counterweight	21,000lbs (9,526kg)	Crate: Misc. Parts Block & Ball	3,500lbs (1588kg)
		47H 10’ Boom Center	700lbs (318kg)		
Total Weights	88,000lbs (39,917kgs)		44,220lbs (20,058kg)		30,325lbs (13,755kg)

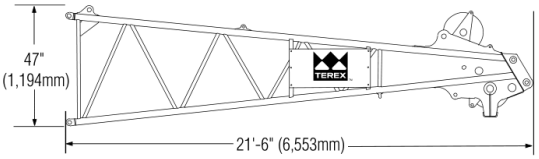
*Loads based on 48 ft flatbed trailer.
Loading information above is an example only, specific loads will vary depending on crane options.

SHIPPING DATA

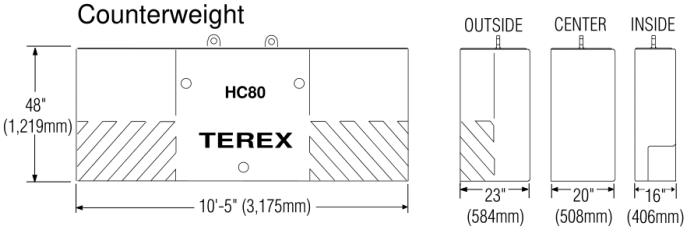
Basic Crane
with 47HI Inner



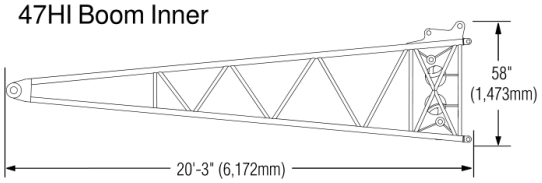
47HI Boom Outer



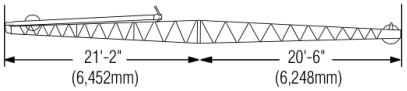
Counterweight



47HI Boom Inner

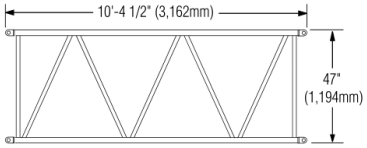


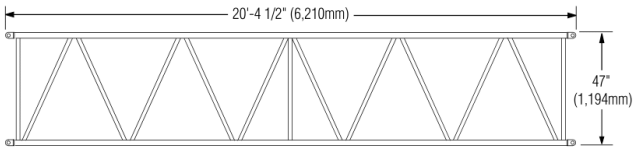
#9HL Jib

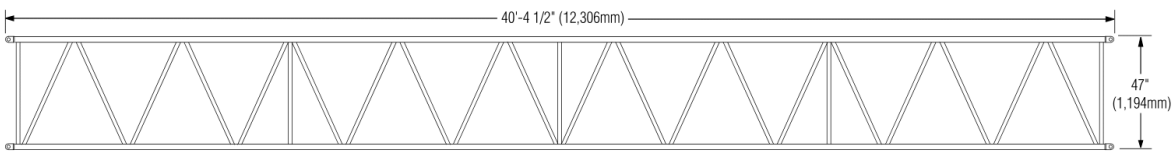


COMPONENT WEIGHTS

	LBS.	KGS.
Basic Upper, Carbody, Boom Inner and Side Frames	88,000	39,917
Counterweight - Total	58,000	26,309
Inside Counterweight	16,000	7,258
Center Counterweight	21,000	9,526
Outside Counterweight	21,000	9,526
Boom Inner 47HI	3,660	1,660
Boom Outer 47HI	2,225	1,009
Boom Center Section with Pendants - 10 ft. - 47H	700	318
Boom Center Section with Pendants - 20 ft. - 47H	1,230	558
Boom Center Section with Pendants - 30 ft. - 47H	2,045	928
Jib Inner with Mast, 9HL	890	404
Jib Outer with Pendant, 9HL	665	303
Jib Center Section with Pendant, 10 ft. 9HL	190	87
Jib Center Section with Pendant, 20 ft. 9HL	385	175







BOOM COMPOSITION CHART

Boom Length Feet	Boom Sections				
	20' 47HI Inner	10' 47H Center	20' 47H Center	30' 47H Center	20' 47HI Outer
40	1	0	0	0	1
50	1	1	0	0	1
60	1	0	1	0	1
70	1	0	0	1	1
80	1	1	0	1	1
90	1	0	1	1	1
100	1	0	0	2	1
110	1	1	0	2	1
120	1	0	1	2	1
130	1	0	0	3	1
140	1	1	0	3	1
150	1	0	1	3	1
160	1	0	0	4	1
170	1	1	0	4	1
180	1	0	1	4	1
190	1	0	0	5	1
200	1	1	0	5	1

#9HL Jib Composition

Jib Length Feet	20' Inner	10' Center	20' Center	20' Outer
40	1	0	0	1
50	1	1	0	1
60	1	0	1	1

LOAD HOISTING INFORMATION

Maximum Lifting Capacity in Pounds	Minimum Parts of Line	Maximum Hoisting Dist. in Ft.
		Main & Auxiliary
160,000	8	73
159,180	7	84
136,440	6	98
113,700	5	117
90,960	4	147
68,220	3	196
45,480	2	294
22,740	1	588

SPECIFICATIONS

Swing Speed ..... 3.30 RPM
Travel Speed ..... 1.24 MPH High Range
..... 0.8 MPH Low Range
Gradeability ..... 40% (approximately 22°)

GROUND PRESSURE

Lifting crane with 40' 47HI boom, standard counterweight
36" (914 mm) Shoes ..... 9.17 psi

MAXIMUM BOOM & JIB SELF-ERECTION DATA

#9HL JIB	Over The End		Over The Side	
	Boom Length Ft.	Jib Length Ft.	Boom Length Ft.	Jib Length Ft.
	200	0	200	0
	170	60	170	60

HC80 DRUM PERFORMANCE

MAIN & AUXILIARY HOIST - 7/8" DIAMETER ROPE

Rope Layer	Low Range		High Range		
	Line Speed Ft. per Min.	Single Line Pull Pounds**	Line Speed Ft. per Min.	Single Line Pull Pounds**	Total Rope Length Ft.
1	258	32,400	337	24,400	81
2	279	29,900	365	22,500	174
3	300	27,900	392	21,000	268
4	321	26,000	420	19,600	375
5	336	24,500	447	18,400	482
6	363	23,000	474	17,300	603
7*	379	22,100	495	16,600	722
8*	407	20,500	532	15,430	860
*RECOMMENDED FOR STORAGE ONLY					

3rd DRUM WITH FREE FALL - 5/8" DIAMETER ROPE

Rope Layer	Load		No Load	
	Line Speed Ft. per Min.	Single Line Pull Pounds**	Line Speed Ft. per Min.	Total Rope Length Ft.
1	181	18,600	219	59
2	195	17,300	235	118
3	209	16,200	252	185
4	222	15,200	269	253
5	236	14,300	285	329
6	250	13,500	302	405
7	263	12,800	318	490
8	277	12,200	335	575
9	291	11,600	352	669
10	305	11,100	368	761
11*	317	10,590	384	835
*RECOMMENDED FOR STORAGE ONLY				

**Single Line Pull reflects the maximum hydraulic capability of the hoist unit at the given layer and range setting. The allowable single line pull may be limited by the strength of the hoist rope. See load hoisting table for rope limitations.

CRANE RATING DATA

⚠ WARNING

This rating is invalid if the crane has been modified or altered by use of other than GENUINE AMERICAN PARTS as such modifications or alterations may affect its capacity or safe operation. See American Crane Corporation Service Bulletin #259.

The ratings in this chart are for planning purposes only. Only those ratings specifically assigned to a crane and mounted in the operator's cab or in the Operator's Manual should be used for actual operation.

Ratings in this chart are in POUNDS and do not exceed the percentage of tipping specified for this crane by ANSI B30.5. All ratings require that the crane be standing level on a firm uniformly supporting surface.

Do not lift loads in excess of those shown on this chart. Lifting loads in excess of those shown or operation not in accordance with good operating practice, including limitations shown on page 3499 of Operator's Manual, can cause tipping, structural damage or catastrophic failure.

Asterisk (*) areas on this chart indicate ratings which are limited by strength of material or factors other than stability (tipping).

"RADIUS IN FEET" is the horizontal distance at ground level from the crane centerline of rotation to a vertical line through the center of gravity of the suspended load.

When using the main boom fall with jib in place, the main fall ratings must be reduced by the jib effective weight shown on the jib rating chart plus twice the weight of all suspended blocks, slings, rope, etc., at the jib fall.

When using the main boom fall with boom tip extension in place, the main fall ratings must be reduced by the weight of the boom tip extension plus twice the weight of all suspended blocks, slings, rope, etc., at the boom tip extension fall.

Blocks, slings, buckets and other load carrying devices are considered part of the load. The weight of standard hoisting ropes for the rating at a given radius has been calculated as part of the boom point load and need not be considered in determining net allowable loads.

Ratings shown on this chart make no allowance for such factors as out of plumb loads, wind, poor soil conditions, and dynamic effects due to excessive operating speeds. The user (operator) must exercise judgement to make allowance for these conditions. See page 3499 of Operator's Manual for detailed information.

No account is taken of the wind force on the load. This effect, which can be substantial for loads with large surface areas, must be considered by the user. In any wind it is strongly recommended that taglines be used to control the load.

BOOM HOIST LINE is 14 parts of 5/8 inch diameter EIPS wire rope with a minimum breaking strength of 41,200 pounds.

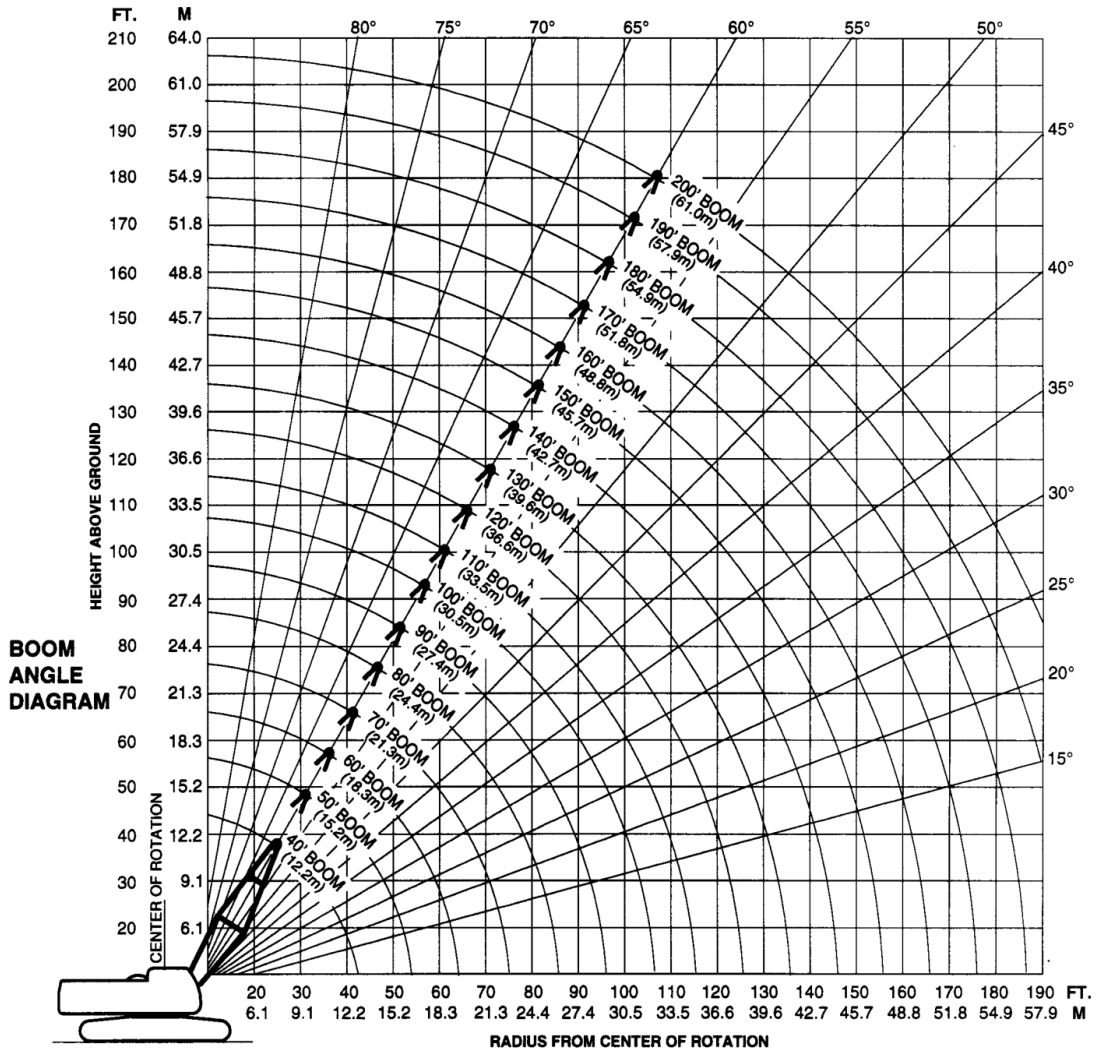
PENDANT SUSPENSION LINE is 2 parts of 1-1/4 inch diameter MONOLAY wire rope with a minimum breaking strength of 172,800 pounds.

MAIN AND AUXILIARY LOAD LINES are 7/8 inch diameter EIPS wire rope with a minimum breaking strength of 79,600 pounds.

THIRD DRUM LINE is 5/8 inch diameter IPS wire rope with a minimum breaking strength of 35,000 pounds.

Erection "OVER THE END" is with the boom over the idler end. Erection "OVER THE SIDE" is with the boom 90˚ to the side frames and with the side frames extended. Blocks, slings and other load carrying devices must be on the ground during erection.

AMERICAN MODEL HC 80 WORKING RANGES WITH 47HI BOOM



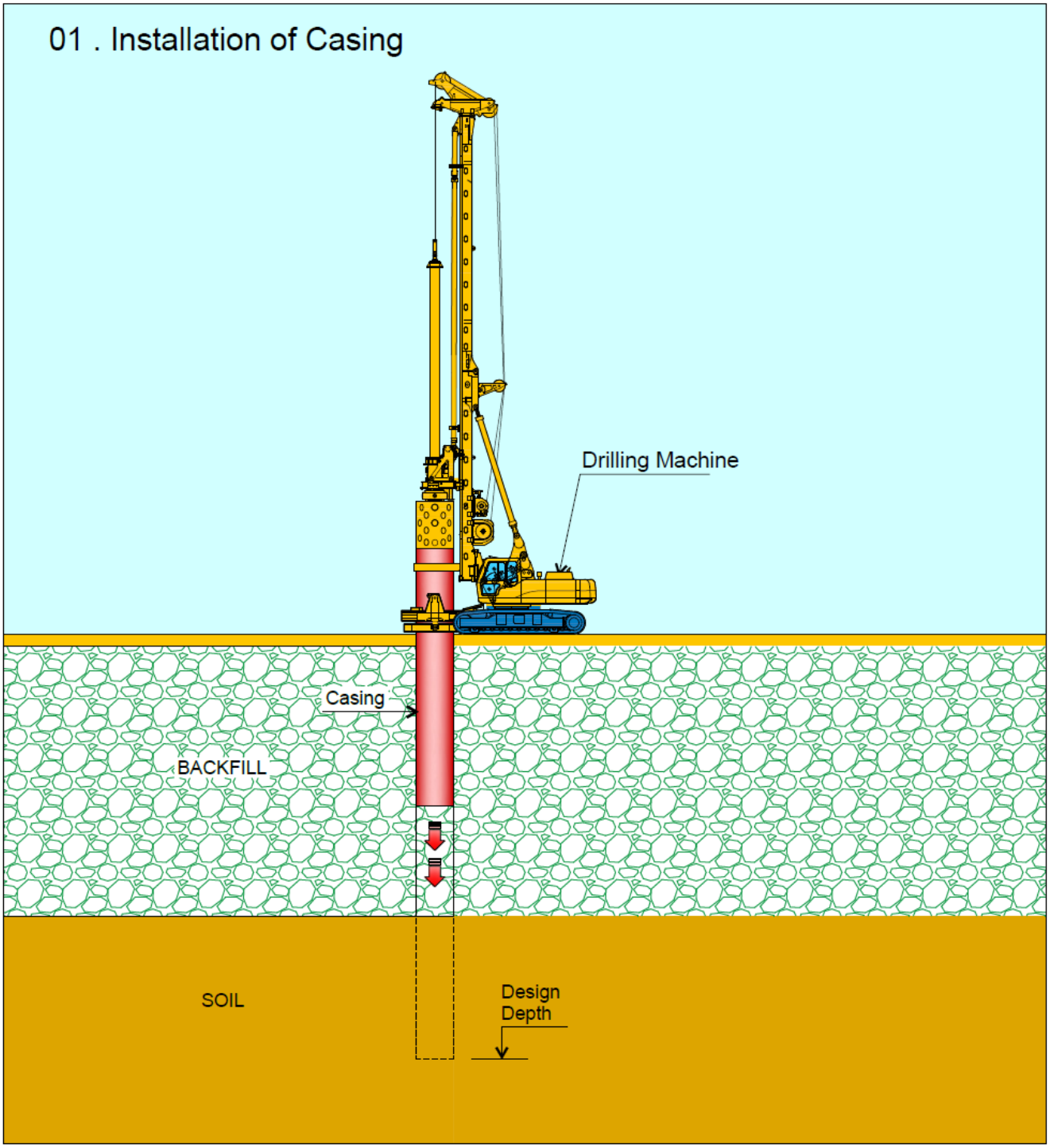
For more information, product demonstration, or details on sales, lease and rental plans, please contact your local Terex American Crane Distributor.

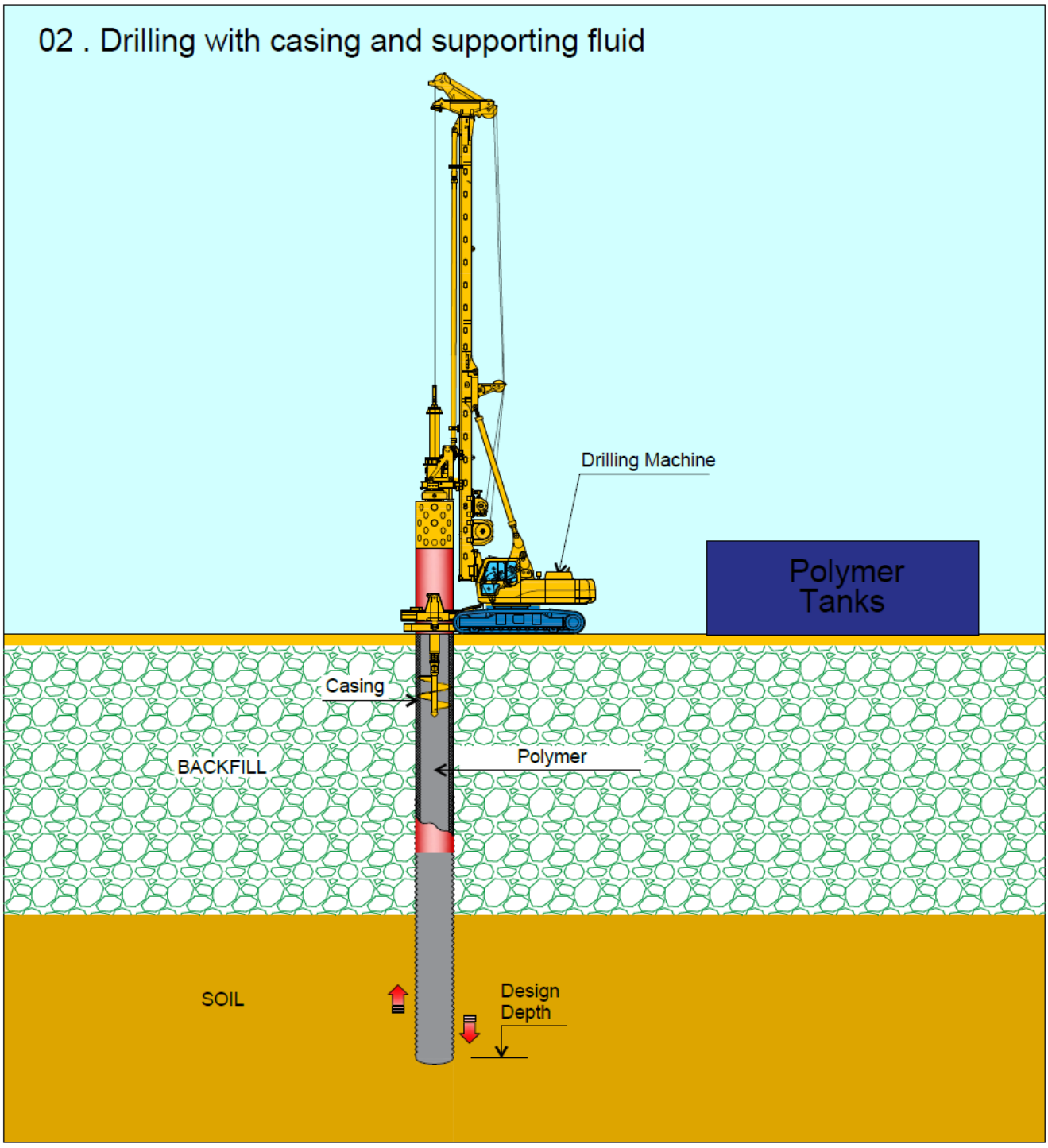
We reserve the right to amend these specifications at any time without notice. The only warranty applicable is our standard written warranty applicable to the particular product and sale. We make no other warranty, expressed or implied.

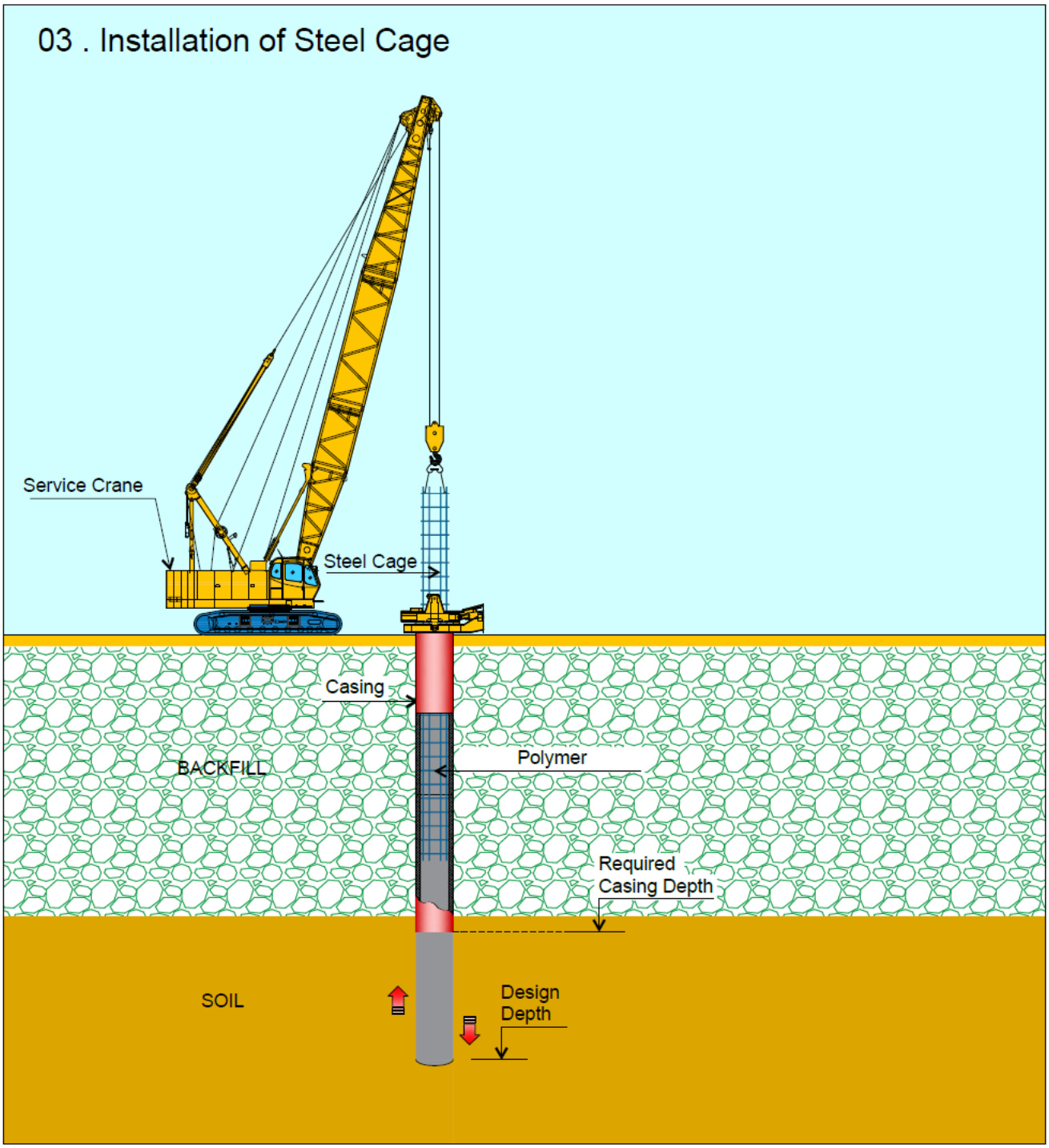
TEREX CRANES
AMERICAN CRANE CORPORATION
202 Raleigh Street
Wilmington, NC 28412 USA
(910) 395-8500 • FAX: (910) 395-8538
E-mail: american@american-crane.com
www.terexlift.com

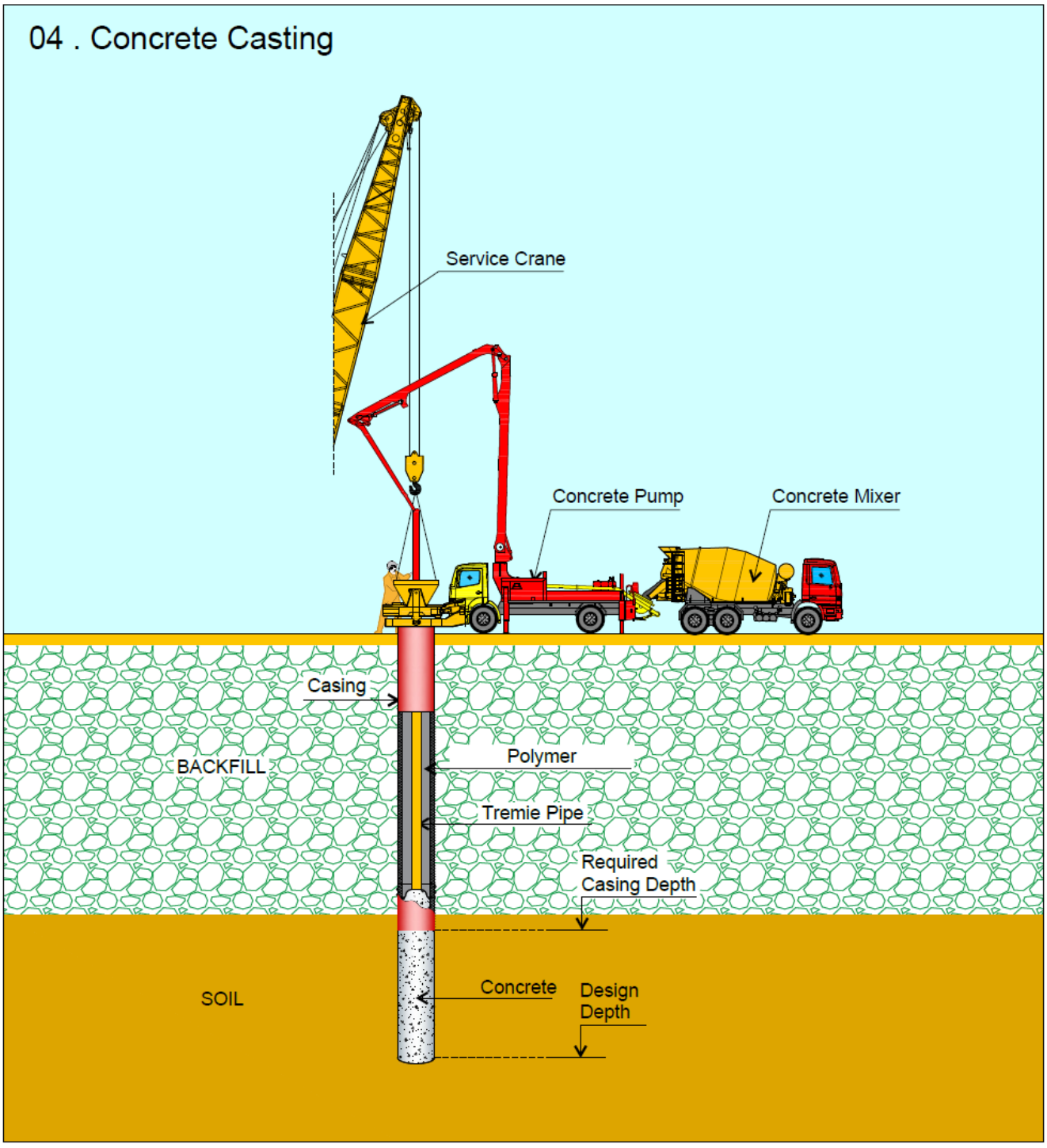
HC-80-CR-47HI3
Terex Cranes, Inc. 2001
Litho in U.S.A.
LP1101

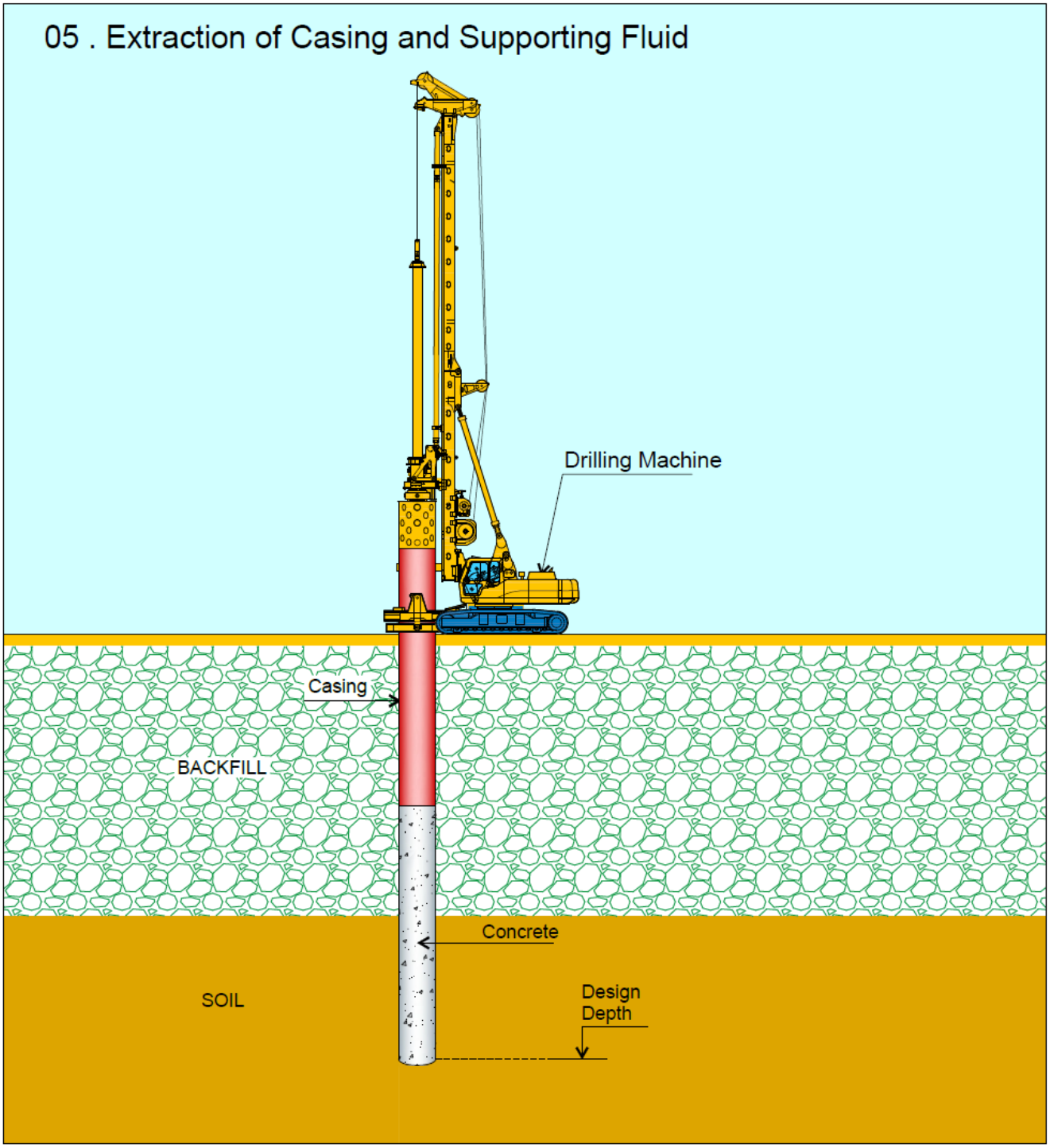
9.5 Schematic Sketchs for the Bored Piles Execution with Casing and Supporting Fluid

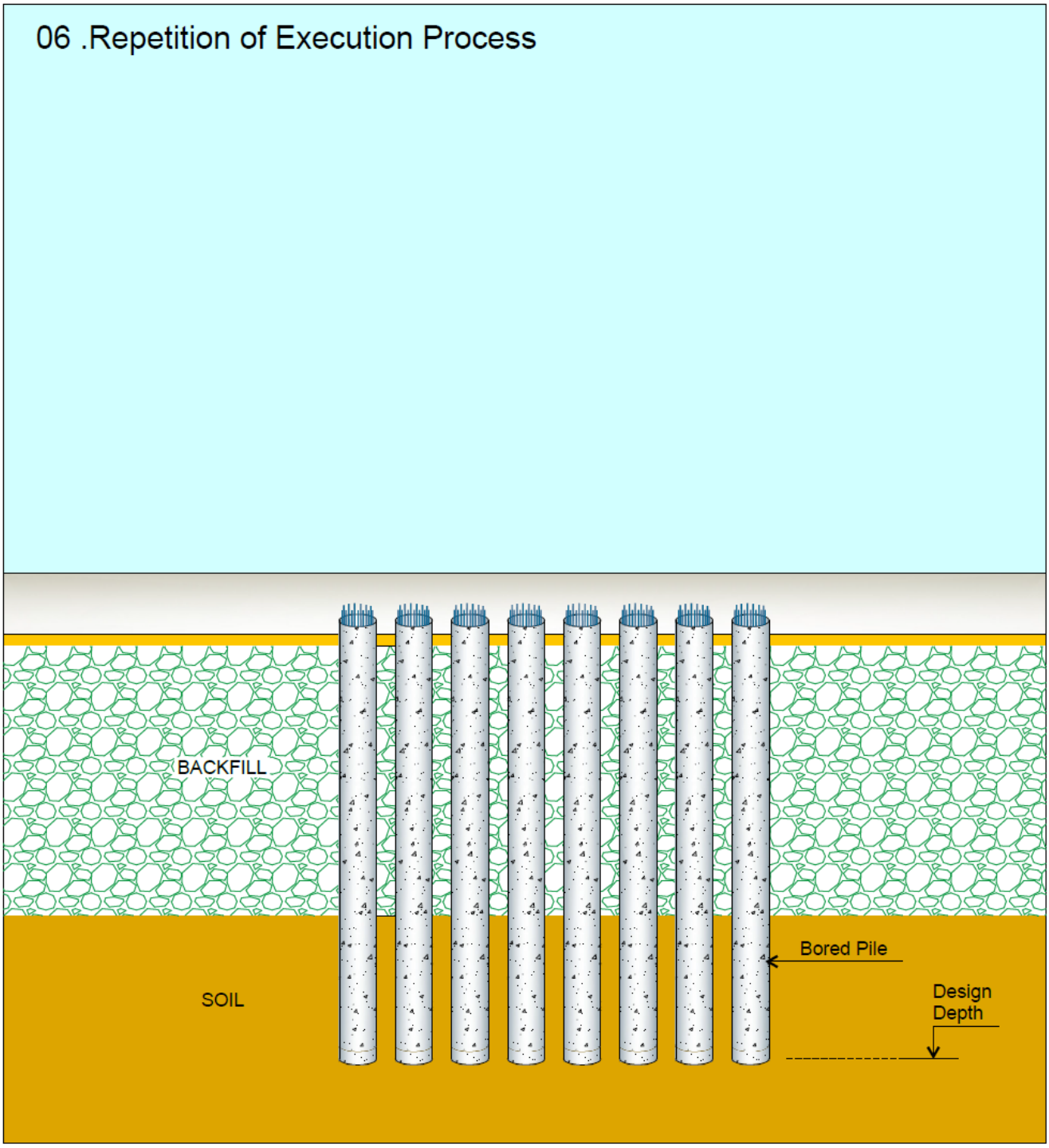



02 . Drilling with casing and supporting fluid
Drilling Machine
Polymer Tanks
Casing
BACKFILL
Polymer
SOIL
Design Depth

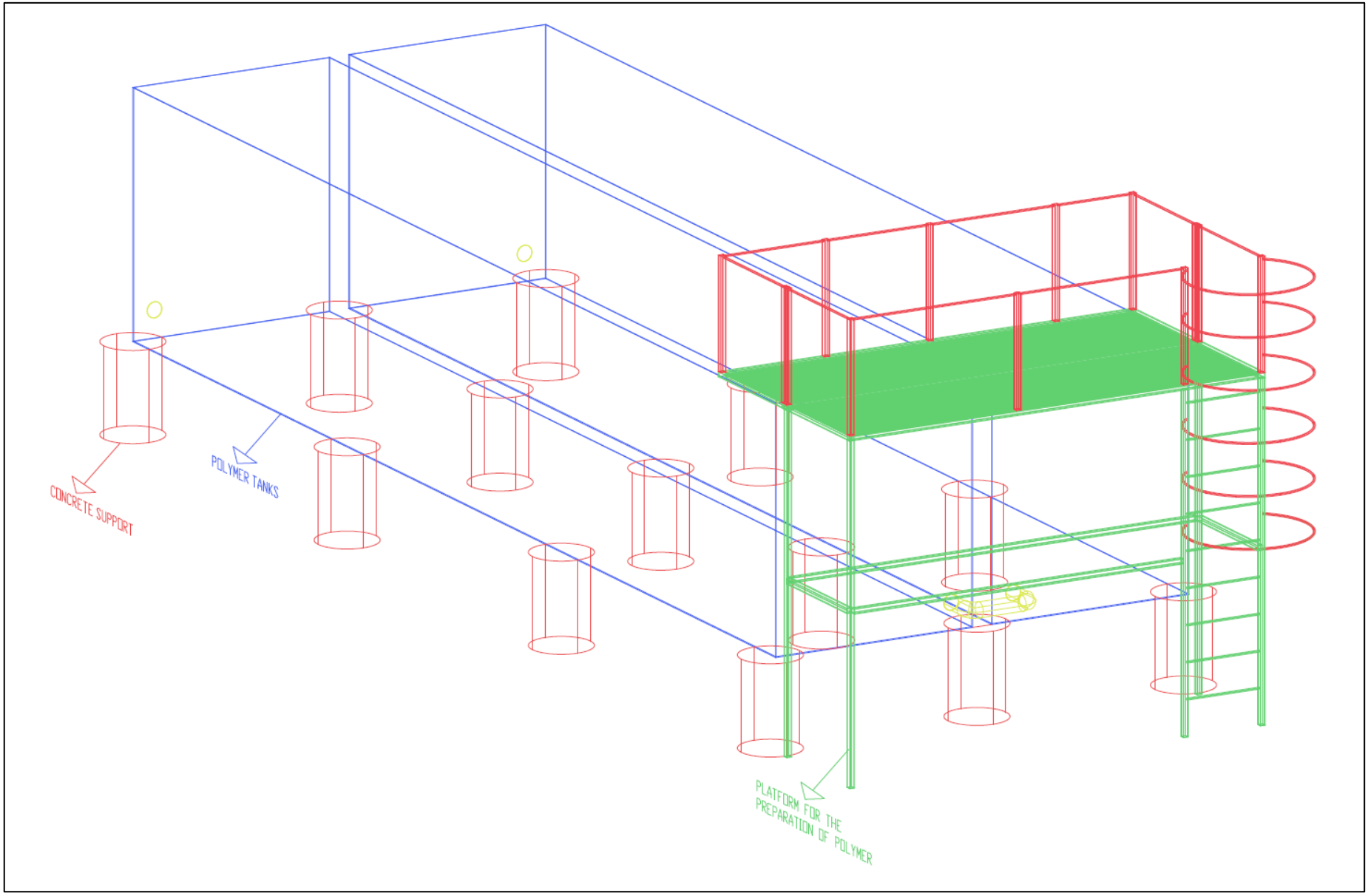

03 . Installation of Steel Cage
Service Crane
Steel Cage
Casing
BACKFILL
Polymer
Required
Casing Depth
SOIL
Design
Depth


04 . Concrete Casting
Service Crane
Concrete Pump
Concrete Mixer
Casing
BACKFILL
Polymer
Tremie Pipe
Required
Casing Depth
SOIL
Concrete
Design
Depth

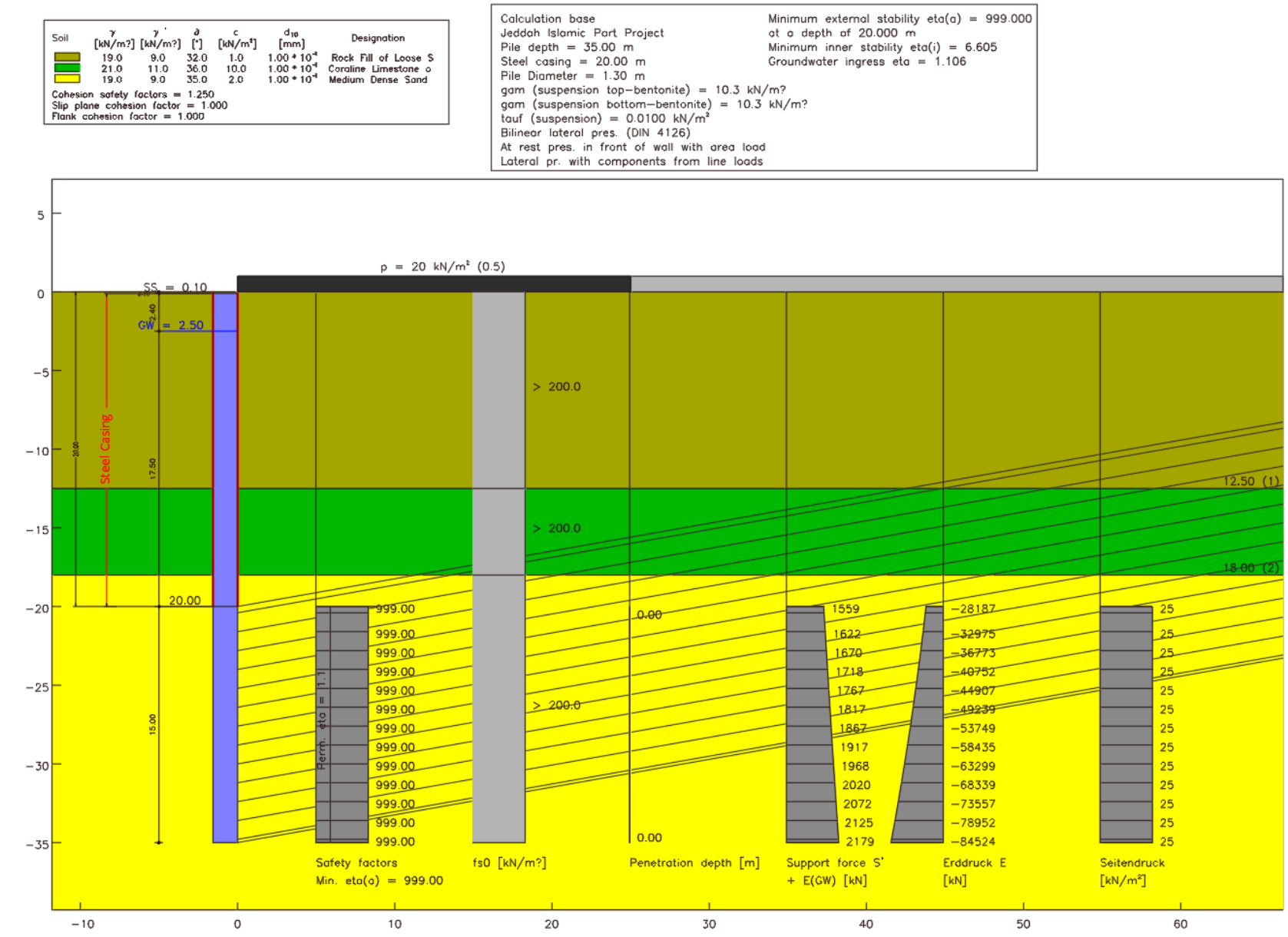

05 . Extraction of Casing and Supporting Fluid
Drilling Machine
Casing
BACKFILL
Concrete
SOIL
Design
Depth


06 .Repetition of Execution Process
BACKFILL
SOIL
Bored Pile
Design
Depth

9.6 Schematic Sketch for Polymer Setup



9.7 Trench Stability Analysis for the Bored Piles Execution with Casing and Supporting Fluid



Stabilty of slurry walls acc. to German standard DIN 4126

==========

Pile depth [m]: 35.00
Pile Diameter [m]: 1.30
Steel casing depth [m]: 20.00
Slip plane angle (min) [°]: 10.00
Slip plane angle (max) [°]: 80.00
Number of slip planes
Angle subdivisions: 80
Groundwater level [m]: 2.50
Unit weight of water [kN/m³]: 10.00
Suspension surface (SS) [m]: 0.10
Unit weight of suspension [kN/m³]
(top): 10.30
Unit weight of suspension [kN/m³]
(bottom): 10.30
tauf (suspension) [kN/m²]: 0.01000
Ground gradient [°]: 0.00
Area load [kN/m²]: 20.00

Bilinear lateral pres. (DIN 4126)
At rest pres. in front of guide wall calculated incl. area load

Soil table

Soil	Base [m]	gam(f) [kN/m³]	gam' [kN/m³]	phi [°]	c [kN/m²]	d10 [mm]
1	12.50	19.00	9.00	32.0	1.00	1.00E-1
2	18.00	21.00	11.00	36.0	10.00	1.00E-1
3	50.00	19.00	9.00	35.0	2.00	1.00E-1

Cohesion eta(c) safety factor: 1.250

Newly calculated soil table

Soil	Base [m]	gam(f) [kN/m³]	gam' [kN/m³]	phi [°]	red c [kN/m²]	d10 [mm]
1	12.50	19.00	9.00	32.0	0.80	1.00E-1
2	18.00	21.00	11.00	36.0	8.00	1.00E-1
3	50.00	19.00	9.00	35.0	1.60	1.00E-1

red c = c / eta(c) [DIN 4126 9.1.4.1]

Cohesion factor in the slip plane: 1.000
Cohesion factor in the flanks: 1.000

SAFETY FACTOR GROUNDWATER (DIN 4126; 9.1.1)

==========

eta(gw) = 1.106 > 1.05 ...OK (DIN 4126:2004)

==========

INNER STABILItY (DIN 4126; 9.1.2)

fs0 = hydr. gradient

Soil	Unterkante [m]	gam'' [kN/m³]	fs0 [kN/m³]	eta(i) [-]
1	12.50	9.00	200.00	6.94
2	18.00	11.00	200.00	6.60
3	50.00	9.00	200.00	7.78

Line loads

Lateral pr. will be calculated with components from line loads.

No.	sigma [kN/m²]	x(left) [m]	x(right) [m]	Depth [m]	Factor [-] Lateral pressure
1	20.00	0.00	25.00	2.50	0.5000

Penetration depths s

Depths [m]	s(top) [m]	s(bottom) [m]
20.00 - 35.00	0.00	0.00

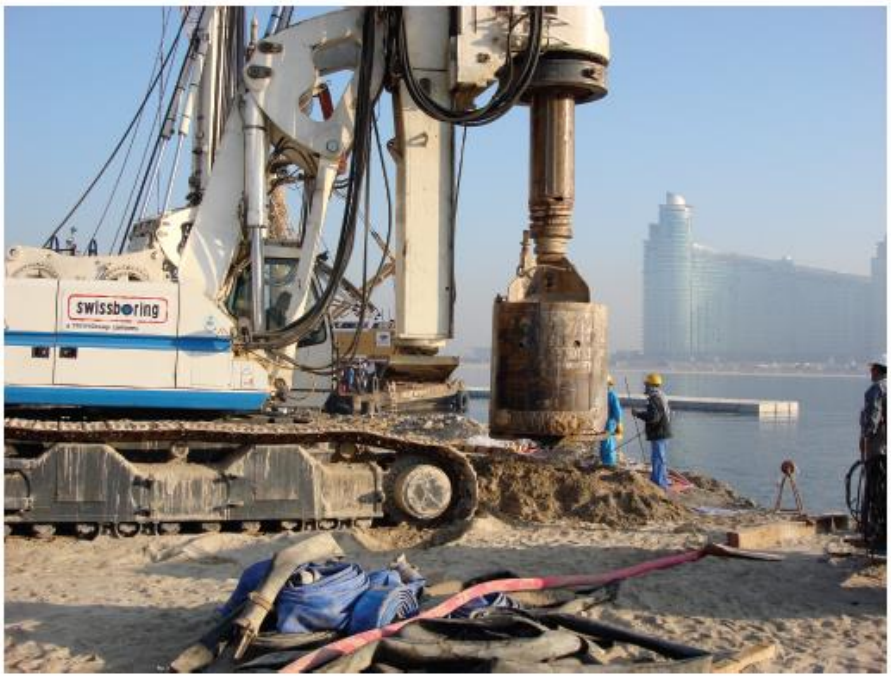
EXTERNAL STABILITY (DIN 4126; 9.1.4)

Depth [m]	eta(a) [-]	tetta [°]	Support force effective [kN]	Earth pr. Guide wall [kN]	Earth pr. Slip body [kN]
20.00	999.000	10.00	0.00	1559.37	-28187.31
20.40	999.000	10.00	15.62	1559.37	-29354.67
21.60	999.000	10.00	62.84	1559.37	-32974.84
22.80	999.000	10.00	110.62	1559.37	-36773.36
24.00	999.000	10.00	158.96	1559.37	-40751.54
25.20	999.000	10.00	207.87	1559.37	-44906.81
26.40	999.000	10.00	257.34	1559.37	-49239.16
27.60	999.000	10.00	307.37	1559.37	-53748.60
28.80	999.000	10.00	357.96	1559.37	-58435.12
30.00	999.000	10.00	409.11	1559.37	-63298.72
31.20	999.000	10.00	460.82	1559.37	-68339.38
32.40	999.000	10.00	513.10	1559.37	-73557.11
33.60	999.000	10.00	565.94	1559.37	-78951.91
34.80	999.000	10.00	619.34	1559.37	-84523.78
35.00	999.000	10.00	628.29	1559.37	-85469.64

Minimum external stability eta(a) = 999.000 at a depth of 20.000 m …OK

9.8 Quality and Safety Sheets for Polymer

SlurrySMART



Technology to Build On!

KB International LLC © Copyright 2013
SSJN090513

NSF International

789 N. Dixboro Road, Ann Arbor, MI 48105 USA

RECOGNIZES

KB International, LLC

Chattanooga, TN

AS COMPLYING WITH NSF/ANSI 60 AND ALL APPLICABLE REQUIREMENTS.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.

ANSI Accredited Program
PRODUCT CERTIFICATION
#0216

Certification Program
Accredited by the
American National
Standards Institute

Certification Program
Accredited by the
Standards Council
of Canada

This certificate is the property of NSF International and must be returned upon request. This certificate remains valid as long as this client has products in Listing for the referenced standards. For the most current and complete Listing information, please access NSF's website (www.nsf.org).

September 1, 2015
Certificate# C0261752 - 01

David Purkiss
General Manager, Water Systems

SECTION 1. IDENTIFICATION OF SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 PRODUCT IDENTIFIER:

Product or Trade Name: **SlurryPRO® CDP**

1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST:

Recommended Use(s)*: Deep foundations excavation fluid additive, drilling fluid additive, rheology modifier, filtrate control agent, membrane enhancer

* *The "Recommended Use(s)" identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.*

Use Application(s): Professional Use Only

Recommended Restrictions: No restrictions on use known.

1.3 DETAILS OF THE SUPPLIER OF THE SUBSTANCE/MIXTURE AND SAFETY DATA SHEET:

Manufacturer/Supplier:

KB International LLC
735 Broad Street, Suite 209
Chattanooga, TN 37402 USA

Telephone Number: +1 (423) 266-6964

E-mail: info@kbtech.com

1.4 EMERGENCY CONTACT AND TELEPHONE NUMBER:

Emergency Contact: ChemTel, Inc.

Emergency Telephone Number: USA & Canada: +1 (800) 255-3924 Intl: +1 (813) 248-0585

1.5 OTHER MEANS OF IDENTIFICATION:

Chemical Family: Propriety carbonyl acryl-amide copolymer

SECTION 2. HAZARDS IDENTIFICATION

2.1 CLASSIFICATION OF THE SUBSTANCE OR MIXTURE:

Classification in accordance with paragraph (d) of §1910.1200:

As adopted by the competent authority, this product does not require an SDS or hazard warning label.
Not Classified.

2.2 LABEL ELEMENTS:

According to Globally Harmonized System, (GHS):

- This product does not require a hazard warning label in accordance with GHS criteria for this product.

Hazard Pictograms:

Signal Word: Not Classified

Hazard Statements: Not Hazardous

Precautionary Statement(s):

General:

P103 ..... Read label before use.

Prevention: None

Response: None

Storage: None

Disposal:

P501 ..... Dispose of contents or container in accordance with local, regional, national, and/or international regulations.

2.3 HAZARDS NOT OTHERWISE CLASSIFIED (HNOC) OR NOT COVERED BY GHS:

None Known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 COMPONENTS OF SUBSTANCE OR MIXTURE:

Substance	CAS Number	Percent (w/w)	GHS Classification - US
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	60 - 100%	Not classified

The exact percentage (concentration) of the composition has been withheld as proprietary.

SECTION 4. FIRST-AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES:

After Clothing Contact:

- Remove contaminated clothing.
- Wash all soiled clothing before reuse.

After Ingestion:

- Under normal conditions, first aid procedures are not required.

After Inhalation:

- Remove person to fresh air and keep comfortable for breathing.
- If respiratory symptoms persists seek medical attention.

After Skin Contact:

- Brush off loose particles from skin.
- Wash with plenty of water.
- If skin irritation or a rash occurs get medical advice or attention.

After Eye Contact:

- If in contact with eyes, rinse cautiously with water for at least 15 minutes under running water with eyelids held open.
- Remove contact lenses, if present and easy to do and continue rinsing.
- If eye irritation persists get medical advise or attention.

4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED:

- No significant hazards expected.

4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED:

Note To Physician:

Treatment:

- Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

5.1 EXTINGUISHING MEDIA:

Suitable Extinguishing Media:

- All standard fire fighting media.

Unsuitable Extinguishing Media:

- None known.

Additional Information:

- If water is used, restrict pedestrian and vehicular traffic in areas where slip hazard may exist.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE / CONDITIONS OF FLAMMABILITY:

Hazards During Fire-fighting:

- Formation of toxic gases is possible during heating or in case of fire.
- Carbon monoxide and carbon dioxide, nitrogen oxides (NOx) and ammonia.
- Very slippery when wet.

Flammability Classification (OSHA 29 CFR 1910.106):

- Not flammable.

Auto Ignition Temp:

- Non-combustible.

5.3 SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:

Protective Equipment for Firefighters:

- Wear a self-contained breathing apparatus.
- Wear full protective suit.

Special Fire-Fighting Procedures:

- The degree of risk is governed by the burning substance and the fire conditions.

5.4 IMPACT SENSITIVITY:

Assessment:

- Not shock-sensitive.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:

- Use appropriate protective equipment.
- Slippery when wet.
- Avoid creating and breathing dust.
- Avoid contact with skin, eyes and clothing.
- Ensure adequate ventilation.
- Refer to Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION, for additional information on acceptable personal protective equipment.

6.2 ENVIRONMENTAL PRECAUTIONS:

- Prevent from entering sewers, waterways, or low areas.

6.3 METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP:

For Small Amounts:

Dry Form:

For Small Amounts:

- Scoop up and remove.
- Dispose contaminated material as waste according to item 13.

For Large Amounts:

- Scoop up and remove.
- Dispose contaminated material as waste according to item 13..

Wet Form:

- Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Pick up mechanically.
- Scoop up and remove.
- Dispose contaminated material as waste according to item 13.

Further Accidental Release Measures:

- Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).
- Forms slippery surfaces with water.

6.4 REFERENCE TO OTHER SECTIONS:

- See Section 7 for information on safe handling.
- See Section 8 for information on personal protection equipment.
- See Section 13 for disposal information.

SECTION 7. HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING:

Handling Precautions:

- Avoid contact with eyes, skin, or clothing.
- Avoid creating or inhaling dust.
- Ensure adequate ventilation.

- Slippery when wet.
- Wash hands after use.
- Launder contaminated clothing before reuse.
- Use appropriate protective equipment.
- Obey all label warnings, especially during container cleaning.
- Do not remove label until container is thoroughly cleaned.
- Do not use container for food, feed or drinking water.

Hygiene Measures:

- Handle in accordance with good industrial hygiene and safety practice.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES:

Storage:

- Store in a cool, dry location.
- Keep container closed when not in use.
- Keep from excessive heat.
- Product has a shelf life of 24 months.

Information About Storage in One Common Storage Facility:

- Store away from foodstuffs.
- Do not store together with oxidizing and acidic materials.
- Do not store together with alkalis (caustic solutions).

Further Information on Storage Conditions:

- Store in unopened original containers in a cool and dry place.
- This product is hydroscopic.

Storage Stability:

- Avoid extreme heat.

Protect from Temperatures Above:

- 70 °C (158 °F)

7.3 SPECIFIC END USE(S):

- Apart from the uses mentioned in section 1.2, no further relevant information available.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ADDITIONAL INFORMATION ABOUT DESIGN OF TECHNICAL SYSTEMS:

Appropriate Engineering Controls:

Advice on System Design:

- No further data; see section 7.

8.1 CONTROL PARAMETERS:

Substance	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable

Components with Limit Values that Require Monitoring at the Workplace:

- Not required.

DNELs:

- No further relevant information available.

PNECs:

- No further relevant information available.

Additional Information:

- The lists that were valid during the creation were used as basis.

8.2 APPROPRIATE ENGINEERING CONTROLS:

- Use in a well ventilated area.

8.2 Individual Personal Protective Measures, such as Personal Protective Equipment:

General Protective and Hygienic Measures:

If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Personal Protective Equipment:

Respiratory Protection:

- Not normally necessary.

Body Protection:

- Light protective work clothing.

Hand Protection:

- *Normal work gloves.*

Eye / Face Protection:

- Safety glasses with side-shields (frame goggles) (e.g. EN 166)

Other Protective Equipment:

- An eyewash station and safety shower should be made available in the immediate working area.
- Other equipment may be required depending on workplace standards.

8.3 GENERAL SAFETY AND HYGIENE CONSIDERATIONS:

- Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation.

Limitation and Supervision of Exposure into the Environment:

- No special environmental precautions required.

Risk Management Measures:

- See Section 7 for additional information.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES:

Appearance:	
Physical State:	Dry/Solid.
Form:	Granular to powder.
Color:	Clear, opaque to white / whitish.
Odor:	Oderless.
Odor Threshold (ppm)**:**	Not determined.
Molecular Formula:	Trade Secret
Molecular Weight:	Trade Secret
Specific Gravity (water = 1)**:**	Not Applicable
Bulk Density (at 20 °C or 68 °F)**:**	Approx. 0.75 g/cm^3 – 0.95 g/cm^3 (750 kg/m^3 – 950 kg/m^3) / 0.027 lb/in^3 – 0.034 lb/in^3 (6.26 lb/gal – 7.93 lb/ga/)
pH (Value)**:**	7.0 - 9.0 (in 5% solution at 20 °C or 68 °F)
Change In Condition:	
Freeze Point:	Not determined.
Melting Point / Range:	Not determined.
Boiling Point / Range:	103 °F or 219 °C
Evaporation Rate:	The product is a non-volatile solid.
Flash Point (°C) [Closed cup]**:**	Not Applicable
Flammability (solid, gaseous)**:**	Not highly flammable.
Danger of Explosion:	Product does not present an explosion hazard in its supplied form.
Explosive Properties:	
Lower Explosion Limit:	For solids not relevant for classification and labelling.
Upper Explosion Limit:	For solids not relevant for classification and labelling.
Auto-ignition Point (°C)**:**	Not self-igniting
Decomposition Temperature (°C)**:**	No decomposition if used as directed.
Auto-ignition:	400 °C (BAM) – 410 °C (BAM)
Minimum Ignition Energy (°C)**:**	>999 mJ
Burning Number:	5
Dust Explosion Class:	St 1

Oxidizing Properties: ..... The substance or mixture is not classified as oxidizing.
Vapor Pressure (mm Hg)**:** ..... The product has not been tested.
Vapor Density (Air=1)**:** ..... No data available.
Relative Density (g/ml @ 20 °C)**:** ..... No data available.
Solubility / Miscibility (Water)**:** ..... Soluble (Forms a viscous solution.)
Solubility (Quantitative)**:** ..... No data available.
Solubility (Qualitative)**:** ..... No data available.
Partition Coefficient (n-octanol/water)**:** .. No data available.
Viscosity (mPa.s)**:**
Dynamic: ..... Not Applicable
Kinematic: ..... Not Applicable
Volatiles (% by weight)**:** ..... Not determined.
Volatile Organic Compounds (VOC's)**:** ..... Not determined.
Absolute Pressure of Container: ..... Not Applicable
Flame Projection Length: ..... Not Applicable
Other Physical/Chemical Comments: ..... If necessary, information on other physical and chemical parameters is indicated in this section.

SECTION 10. STABILITY AND REACTIVITY

10.1 REACTIVITY:

- Stable under normal conditions of use and storage.
- No hazardous reactions if stored and handled as prescribed/indicated. 10.2 Chemical Stability:

Thermal Decomposition / Conditions to be Avoided:

- No decomposition if used and stored according to specifications.

10.3 POSSIBILITY OF HAZARDOUS REACTIONS:

- As the product is supplied it is not capable of dust explosion; however enrichment with fine dust causes risk of dust explosion.
- Reacts with strong oxidizing agents.
- Reacts with strong acids.

10.4 CONDITIONS TO AVOID:

- Avoid extreme heat.
- Avoid dust formation.
- Store away from acids and oxidizing agents.

10.5 INCOMPATIBLE MATERIALS:

- Strong oxidizers.
- Prolonged contact with aluminum.

10.6 HAZARDOUS DECOMPOSITION PRODUCTS:

- Carbon oxides (COx)
- Nitrogen oxides (NOx)
- Ammonia

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 INFORMATION ON LIKELY ROUTES OF EXPOSURE:

Principal Route of Exposure:

- Eye and skin contact.

11.2 SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS:

Acute Toxicity:

Primary Irritant Effect:

Inhalation:

- None known.

Skin:

- Non-irritating to skin in rabbits.

Eye:

- Non-irritating to rabbit's eye.

Ingestion:

- None known.

Sensitization:

- No sensitizing effects known.

Additional Toxicological Information:

- When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

Assessment of Acute Toxicity:

- Based on the ingredients, there is no suspicion of a skin-sensitizing potential.

Aspiration Hazard:

- No aspiration hazard expected.

Chronic Toxicity/Effects:

Repeated Dose Toxicity:

Assessment of Repeated Dose Toxicity:

- Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses. The product has not been tested. The statement has been derived from the properties of the individual components.

Genetic Toxicity:

Assessment of Mutagenicity:

- Based on the ingredients, there is no suspicion of a mutagenic effect.

Carcinogenicity:

Assessment of Carcinogenicity:

- The whole of the information assessable provides no indication of a carcinogenic effect.

Carcinogenic Categories:

IARC (International Agency for Research on Cancer)	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a probable, possible or confirmed human carcinogen.
OSHA - CA (Occupational Safety & Health Administration)	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen.
NTP (National Toxicology Program)	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen.
ACGIH (The American Conference of Governmental Industrial Hygienists)	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen.

Reproductive Toxicity:

Assessment of Reproduction Toxicity:

- Based on the ingredients, there is no suspicion of a toxic effect on reproduction.

Other Information:

- The product has not been tested. The statements on toxicology have been derived from products of a similar structure and composition.

Symptoms of Exposure:

- No significant symptoms are expected due to the non-classification of the product.

Additional Toxicological Information:

- When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

SECTION 12. ECOLOGICAL INFORMATION

12.1 TOXICITY:

Acute Toxicity:

Substance	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available	No information available	No information available	No information available

12.2 PERSISTENCE AND DEGRADABILITY:

- Biodegradable, Photodegradable.

12.3 BIOACCUMULATIVE POTENTIAL:

- No further relevant information available.

12.4 MOBILITY IN SOIL:

- No further relevant information available.

12.5 RESULTS OF PBT AND VPVB ASSESSMENT:

PBT: Not applicable

VPVB: Not applicable

12.6 OTHER ADVERSE ECOLOGICAL EFFECTS:

- No further relevant information available.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS:

Unused Material and Residue:

Recommendations:

- Can be burned with household garbage after consulting with the waste disposal facility operator and the pertinent authorities and adhering to the necessary technical regulations.
- Smaller quantities can be disposed of with household waste.
- The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

Uncleaned Packagings:

Recommendations:

- Follow all applicable national or local regulations.

Recommended Cleansing Agents:

- Water, if necessary together with cleansing agents.

RCRA:

- Not a hazardous waste under RCRA (40 CFR 261).

SECTION 14. TRANSPORTATION INFORMATION

US:

14.1 UN Number: (DOT, ADR, ADN)	Not Regulated
14.2 UN Proper Shipping Name: (DOT, ADR, ADN)	Not Regulated
14.3 Transpot Hazard Class(es): (DOT, ADR, ADN)	Not Regulated
14.4 Packing Group: (DOT, ADR)	Not Regulated
14.5 Environmental Hazard(s): Marine Pollutant:	Not Regulated

Canadian TDG:

14.1 UN Number:	Not Regulated
14.2 UN Proper Shipping Name:	Not Regulated
14.3 Transpot Hazard Class(es):	Not Regulated
14.4 Packing Group:	Not Regulated
14.5 Environmental Hazard(s): Marine Pollutant:	Not Regulated

IMDG/IMO:

14.1 UN Number:	Not Regulated
14.2 UN Proper Shipping Name:	Not Regulated
14.3 Transpot Hazard Class(es):	Not Regulated
14.4 Packing Group:	Not Regulated
14.5 Environmental Hazard(s): Marine Pollutant:	Not Regulated

IATA/ICAO:

14.1 UN Number:	Not Regulated
14.2 UN Proper Shipping Name:	Not Regulated
14.3 Transpot Hazard Class(es):	Not Regulated
14.4 Packing Group:	Not Regulated
14.5 Environmental Hazard(s): Marine Pollutant:	Not Regulated

Transport in Bulk According to Annex II of MARPOL73/78 & the IBC Code: UN "Model Regulation":

- None regulated.

Special Precautions for User:

- None reported by the manufacturer.

Environmental Hazards:

- See ECOLOGICAL INFORMATION, Section 12.

SECTION 15. REGULATORY INFORMATION

15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE OR MIXTURE UNITED STATES (USA) COMPONENTS LISTED BELOW ARE PRESENT ON THE FOLLOWING U.S. FEDERAL CHEMICAL LISTS:

TSCA:

Significant New Use Rules – (S5A2)):	All chemical substances in this product are either listed on the TSCA Inventory or in compliance with a TSCA Inventory exemption.

SARA:

Section 302 (Extremely Hazardous Substances Listings):	None of the chemical substances in this product are subject to reporting.
Section 311/312 (Hazardous Chemical Inventory):	No SARA Hazards
Section 355 (Extremely Hazardous Substances Listing):	None of the chemical substances in this product are listed.
Section 313 (Specific Toxic Chemical Listings):	None of the chemical substances in this product are listed in TRI Group I or Group II.

EPA RCRA:

Hazardous Waste Classification:	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

EPA CERCLA:

Superfund Reportable Spill Quantity:	Not applicable.

Clean Air Act:

Section 12 (40 CFR 61):	This product does not contain any hazardous air pollutants (HAP)
Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F):	None of the chemical substances in this product are listed.

Clean Water Act:

Section 311, Table 116.4A (List of Hazardous Substances):	This product does not contain any hazardous substances listed.
Section 311, Table 117.3 (Reportable Quantities of Hazardous Substances List):	None of the chemical substances in this product are listed.
Section 307 (Toxic and Priority Pollutants):	This product does not contain any toxic or priority pollutants.

Proposition 65 (California):

Chemicals Known to Cause Cancer:	None of the chemical substances in this product are listed.
Chemicals Known to Cause Reproductive Toxicity for Females:	None of the chemical substances in this product are listed.
Chemicals Known to Cause Reproductive Toxicity for Males:	None of the chemical substances in this product are listed.
Chemicals Known to Cause Developmental Toxicity:	None of the chemical substances in this product are listed.

Other U.S. States and Communities:

RTKHSL (Right to Know Hazardous Substance List):	None of the chemical substances in this product are listed.

Carcinogenic Categories:

EPA (Environmental Protection Agency):	None of the chemical substances in this product are listed.
IARC (International Agency for Research on Cancer):	None of the chemical substances in this product are listed.
TLV (Threshold Limit Value Established by ACGIH):	None of the chemical substances in this product are listed.
NIOSH-CA (National Institute for Occupational Safety and Health):	None of the chemical substances in this product are listed.

Canada:

DSL (Canadian Domestic Substances List):	All of the chemical substances in this product are either listed on the DSL Inventory or in compliance with a DSL exemption.
Canadian Ingredient Disclosure List (limit 0.1%):	None of the chemical substances in this product are listed.
Canadian Ingredient Disclosure List (limit 1.0%):	None of the chemical substances in this product are listed.

Other Regulations, Limitations and Prohibitive Regulations:

Substances of Very High Concern (SVHC) According to REACH, Article 57	None of the chemical substances in this product are listed.

Switzerland:

CH INV (New Notified Substances and Declared Preparations):	YES. The mixture contains a polymer. The monomers for this polymer have been notified.

Germany:

MAK (German Maximum Workplace Concentration):	None of the chemical substances in this product are listed.

Australia:

AICS (Australia Inventory of Chemical Substance):	YES. On the inventory, or in compliance with the inventory.

New Zealand:

NZIoC (New Zealand Inventory of Chemical Substances):	NO. On the inventory, or in compliance with the inventory.

Japan:

ENCS (Existing and New Chemical Substances Inventory):	YES. On the inventory, or in compliance with the inventory
ISHL - (Inventory of Chemical):	YES. On the inventory, or in compliance with the inventory

Korea:

KECI (Korean Existing Chemicals Inventory:	YES. On the inventory, or in compliance with the inventory.

Philippines:

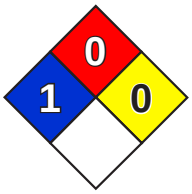
PICCS (Philippines Inventory of Chemicals and Chemical Substances):	YES. On the inventory, or in compliance with the inventory.

China

IECSC (Inventory of Existing Chemical Substances in China):	YES. On the inventory, or in compliance with the inventory

For explanation of abbreviation see section 16.

NFPA AND HMIS RATINGS:



Health = 0
Fire = 1
Reactivity = 0

NFPA Scale (0-4)

HEALTH	0
FLAMMABILITY	1
REACTIVITY	0
PERSONAL PROTECTION	B

Health = 0
Fire = 1
Reactivity = 0
PPE = B

HMIS Ratings (0-4)

15.2 CHEMICAL SAFETY ASSESSMENT:

- A Chemical Safety Assessment has not been carried out.

SECTION 16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations. Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

Abbreviations and acronyms:

ADRADR:	Accord Européen sur le Transport des Marchandises Dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
AICS:	Australia Inventory of Chemical Substances
CA:	California
CAS:	Chemical Abstract Services (division of the American Chemical Society)
CERCLA:	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR:	Code of Federal Regulations
CH INV:	Switzerland. New Notified Substances and Declared Preparations
CSA:	Canadian Standards Association
DNEL:	Derived No-Effect Level (REACH)
DOT:	Department of Transportation
DSL:	Canadian Domestic Substance List
ECHA:	European Chemical Agency
ENCS:	Japanese Existing and New Chemical Substances Inventory
EPA:	Environmental Protection Agency
GHS:	Globally Harmonized System of Classification and Labelling of Chemicals
HMIS:	Hazardous Materials Identification System
HSDB:	Hazardous Substances Data Bank
IARC:	International Agency for Research on Cancer
IATA:	International Air Transport Association
ICAO:	International Civil Aviation Organisation
IECSC:	Inventory of Existing Chemical Substances in China
IMDG:	International Maritime Dangerous Goods
Inh:	Inhalation
ISHL:	Japanese Inventory of Chemical Substances
KECI:	Korean Existing Chemicals Inventory
LC:	Lethal Concentration
LD:	Lethal Dose
MA:	Massachusetts
MAK:	German Maximum Workplace Concentration
MN:	Minnesota
NFPA:	National Fire Protection Association
NIOSH:	National Institute of Occupational Safety and Health
NJ:	New Jersey
NTP:	National Toxicology Program
NZIoC:	New Zealand Inventory of Chemical Substances
OSHA:	Occupational Safety and Health Administration

PA: Pennsylvania
PEL: Permissible Exposure Limit
PICCS: Philippines Inventory of Chemicals and Chemical Substances
PNEC: Predicted No-Effect Concentration (REACH)
RCRA: Resource Conservation and Recovery Act
REACH: EC 1907/2006
RI: Rhode Island
RTECS: Registry of Toxic Effects of Chemical Substances
SARA: Superfund Amendments and Reauthorization Act
STEL: Short Term Exposure Limit
TDG: Canadian Transportation of Dangerous Goods Act & Regulations
TLV: Threshold Limit Values
TSCA: Toxic Substance Control Act
TWA: Time Weighted Average
WHMIS: Workplace Hazardous Materials Identification System

References:

Canadian Centre for Occupational Health and Safety, CCInfoWeb Databases, 2015 (Chempendium, RTECs, HSDB, INCHEM).
European Chemicals Agency, Classification Legislation, 2015
Material Safety Data Sheet from Manufacturer/Distributor.
OECD: Organization for Economic Co-operation and Development, 2015

Version 1.0	For the New GHS SDS Standard	Revision Date: 12/15/2014
Version 1.1	Hazard and Precautionary Statements	Revision Date: 02/04/2015
Version 1.2	Updated Graphics	Revision Date: 03/09/2015
Version 1.3	UN#, ICC GHS Edits	Revision Date: 05/20/2015
Version 1.4	Edits in Section 9	Revision Date: 05/21/2015
Version 1.5	Edits to Section 5	Revision Date: 06/02/2015
Version 1.6	Additions to Section 9	Revision Date: 06/25/2015

Other Special Considerations for Handling: Provide adequate information, instruction and training for operators.

Miscellaneous Hazard Classes:

Canadian Carcinogenicity Hazard Class: *Not Applicable.*

Physical Hazards Not Otherwise Classified (PHNOC): *Not Applicable.*

Health Hazards Not Otherwise Classified (HHNOC): *Not Applicable.*

KB International LLC
735 Broad Street, Suite 300
Chattanooga, TN 37402
United States of America
Telephone: +1 (423) 266-6964 info@kbtech.com
Main Fax: +1 (832) 202-0231 www.kbtech.com

Current Document Titled: ***Safety Data Sheet SlurryPRO® CDP***	**Supersedes Document Titled:** ***"SlurryPRO® CDP SDS 01/28/2020-gg-ver6-rev15***
Current SDS Code: ***"SlurryPRO® CDP SDS 10//15/2020-ggdg-USA-ver7***	**Previous Document Date of Release:** 01/28/2020
Revision Date: 10/14/2020	**Version No.** 7 **Revision No.** 0
Prepared By: K. Gifford Goodhue, Jr.	**Verified By:** A Gordon on 10/14/2020
Issue Date: 10/15/2020	**Print Date:** 10/15/2020

KB, Technology to Build On! are both registered trademarks of KB International LLC. For more information on our products and services please visit: www.kbtech.com.

End of Safety Data Sheet

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SlurryPro CDP 25Kg/55Lb Bag Lot 483794

Manufacture date: July 25, 2022

Expiration date: July 25, 2032

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483794

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.89
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.072
Molecular Weight (10^6)	24-26	25.63
Hydrolysis (%)	38-40	38.74
Residual Content (%)	≤0.05	.0358

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SlurryPro CDP 25Kg/55Lb Bag Lot 483795

Manufacture date: July 25, 2022

Expiration date: July 25, 2032

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483795

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.83
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.080
Molecular Weight (10^6)	24-26	24.82
Hydrolysis (%)	38-40	39.09
Residual Content (%)	≤0.05	.0347

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SlurryPro CDP 25Kg/55Lb Bag Lot 483796

Manufacture date: July 25, 2022

Expiration date: July 25, 2032

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483796

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.92
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.077
Molecular Weight (10^6)	24-26	24.50
Hydrolysis (%)	38-40	38.42
Residual Content (%)	≤0.05	.0362

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SlurryPro CDP 25Kg/55Lb Bag Lot 483797

Manufacture date: July 25, 2022

Expiration date: July 25, 2032

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483797

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.86
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.073
Molecular Weight (10^6)	24-26	25.10
Hydrolysis (%)	38-40	39.33
Residual Content (%)	≤0.05	.0355

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SlurryPro CDP 25Kg/55Lb Bag Lot 483591

Manufacture date: June 16, 2021

Expiration date: June 16, 2031

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483591

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.78
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.081
Molecular Weight (10^6)	24-26	25.21
Hydrolysis (%)	38-40	38.11
Residual Content (%)	≤0.05	.0355

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SLURRYPRO CDP BG 25 KG/ 55 LB - Lot 483694

Manufacture date: March 18, 2022

Expiration date: March 18, 2032

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483694

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.84
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.080
Molecular Weight (10^6)	24-26	25.22
Hydrolysis (%)	38-40	39.02
Residual Content (%)	≤0.05	.0353

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SLURRYPRO CDP BG 25 KG/ 55 LB - Lot 483695

Manufacture date: October 21, 2021

Expiration date: October 21, 2031

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483695

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.85
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.077
Molecular Weight (10^6)	24-26	25.12
Hydrolysis (%)	38-40	38.71
Residual Content (%)	≤0.05	.0359

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

KB INTERNATIONAL LLC

735 Broad Street
Suite 300
Chattanooga, TN 37402

T +1 423 266-6964
F +1 832 201-9196
info@kbtech.com
www.kbtech.com

CERTIFICATE OF QUALITY/ MANUFACTURING DETAILS

Product: SLURRYPRO CDP BG 25 KG/ 55 LB - Lot 483709

Manufacture date: March 14, 2022

Expiration date: March 14, 2032

Generic Name: Proprietary Anionic Polyacrylamide (Not Hazardous)

Lot Number: 483709

Description: Odorless white powder

Item	Specification	Analysis
Appearance	White Powder	OK
Particle Size (mesh)	≥ 1.0mm, ≤ 5%	OK
	≤ 0.15mm, ≤ 5%	
Solid Content (%)	≥ 88	88.88
Dissolution Time (hours)	≤ 2	2
Insoluble Content (%)	≤0.2	.078
Molecular Weight (10^6)	24-26	24.50
Hydrolysis (%)	38-40	39.02
Residual Content (%)	≤0.05	.0344

SlurryPro CDP is an NSF Certified product. Read more about NSF certification at:
http://www.nsf.org/about-nsf/nsf-mark/

THIS DOCUMENT DOES NOT CARRY A SIGNATURE

ARUP

Greater Male' Connectivity
Male' to Thilafushi Link Project

RSS

Employer's Representative Response to Contractor's Submission

To	: **AFCONS Infrastructure Ltd**
Attn	: **Mr. Satish M. Tengeri**, Project Director
Title of Submission	: **Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**
Your Submission Ref.	: **AFCONS/MTL/SN/0205** **Date : 21 Feb 2022**
Our Ref.	: **MTL/RSS/SNR/R20-445/0173** **Date : 23 Feb 2022**

Our Response:

- ☒ A – No Comment / Acceptable
- ☐ B – Acceptable but subject to comments being addressed, acknowledged and incorporated, please resubmit.
- ☐ C – Rejected, address comments and please resubmit.
- ☐ D – Other: More details information is required.

Comments:

We refer to your Submission Notice ref. AFCONS/MTL/SN/0205 dated 21 Feb 2022 with regard to Material Approval Request for Support Fluid (Polymer): SlurryPro CDP.

We have reviewed the submission documents and have no further comment.

Signed by:

Distribution		Encl
PD - PMU MNPHI	Mahjoob Shujau	☒
Arup Director	Naeem Hussain	☒
Chief Resident Engineer	Cheng Yat Kheong	☒

Colin Williams
Employer's Representative
Acting Chief Resident Engineer

Date: 23-02-2022

File Ref: MTL/RSS/SNR/R20-445/0173

Attachments: **7 Pages**

NH/NY/AZ/SH

SUBMISSION NOTICE continued

Our Ref.: **AFCONS/MTL/SN/0205**

PART B: TO BE COMPLETED BY THE EMPLOYER'S REPRESENTATIVE ON RECEIPT OF THE SUBMISSION NOTICE

Receipt of this Submission Notice is acknowledged by the Employer's Representative.

Signed: ..... Date: 21-02-2022

on behalf of the EMPLOYER

PART C: TO BE COMPLETED BY THE EMPLOYER'S REPRESENTATIVE ON EXPIRY OF THE REVIEW PROCEDURE

The Employer's Representative has completed the review of the above named Contractor's Documents and (tick box(es) as
appropriate):

☒ has no comment / acceptable

☐ has the following comments:

.....

.....

☐ notifies the Contractor that the Contractor's Documents fail to comply with the Contract to the following extent(s), and that said Contractor's Documents should be rectified and resubmitted:

.....

☐ notifies the Contractor of the following Hold Points and Witness Points:

.....

.....

Signed: ..... Date: 23-02-2022

on behalf of the EMPLOYER

Contractor's Submission [Document Reference & Revision]	**AFCON/MTL/SN/0205**	Submission Date:	**21 February 2022**
Employer's Representative Reference:	**MTL/RSS/SNR/R20-445/0173**	Response Date:	**23 February 2022**
Submission Description:	**Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**		

No.	Doc Ref (Section)	Employer's Representative Comments	Contractor's Response	Status
1.	SlurryPro CDP Technical Data Sheet – Environmental Friendly	**Environmentally Friendly** (page 10) a) It is noted from the technical data description that SlurryPro CDP fluids are non-toxic and are readily degradable to facilitate disposal. Please further clarify this by providing supporting documents with laboratory test results and evidence from other projects. b) Please clarify the technical statement that "*SlurryPro CDP fluid can be readily disposed of on-site without treatment*" by providing supporting documents with laboratory test results and evidence from other projects. c) Please clarify about the waste product produced when treating the used SlurryPro CDP using "Klean-Break". d) It is noted that there are several ways to dispose SlurryPro CDP fluid. Please clarify which approach will be used to dispose the SlurryPro CDP fluid for this project and submit the detailed proposal in advance for Employer's review. e) Please be reminded that all drilling waste generated during piling shall be disposed at the	a) KB International has gained disposal approvals in most countries worldwide to be disposed in the storm water drain after being broken down. Please refer to the Lack of primary pollutants document that shows KB Internationals polymer were tested for over 150 pollutants and none have been found, Informe final Determinacion was a tests done in Chile to see if untreated KB polymer had any effect on the natural sea grass in the region and no impact was found, NSF Certification is for KB Polymer to be used with portable drinking water in the USA, Discharge Record, Development of Ecological LC50, Exotex Australia and the SDS of all the products. b) KB International always recommends the system is broken down before disposal, again refer to the lack of primary pollutants document that shows there is no harmful substances in the system. c) When the system has been broken down with Kleenbreak the remaining material is; H20, CO2, NaCL, Fe0 (Ferric Oxide). d) Please refer to the KB Disposal instruction document that runs through the procedure and the materials needed for disposal. Two	Closed

Contractor's Submission [Document Reference & Revision]	**AFCON/MTL/SN/0205**	Submission Date:	**21 February 2022**
Employer's Representative Reference:	**MTL/RSS/SNR/R20-445/0173**	Response Date:	**23 February 2022**
Submission Description:	**Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**		

No.	Doc Ref (Section)	Employer's Representative Comments	Contractor's Response	Status
		designated site, either at the reclamation sites or at Thilafushi. There should be no disposal of supporting fluids direct into the sea as stated in Sub-Clause 4.9 and 6.4.3 of the Environmental and Social Impact Assessment (ESIA), ER Part A1 Annex A9 ESIA Part 1, and this is also subject to the requirement as given in Sub-clause 6 of Environmental Management and Monitoring Plan (EMMP) in ER part A1 Annex A5.	products can be used for the breakdown of the polymer, Kleenbreak and Calcium Hypochlorite (pool Chlorine) e) All rules will be followed by Afcons as per your comments.	
2.	Company Profile	a) Please provide the details of manufacturer including its plant location. b) Please provide evidence from previous work with the support fluid and justification of its suitability for use in this type of marine and coral limestone formation. Particular issues which shall be addressed are the types and sources of the support fluid constituents, time of construction of the piles, ambient temperature, soil and groundwater chemistry as stated in ER Series 1600 Appendix 16/18 Items 2.	a) KB International head office is in Tennessee in the USA with manufacturing in Charlestown, South Carolina for all the speciality additives, EnhancITs, Kobbleblok, SKurryPro MPA, Magmafiber. SlurryPro CDP and PolyCUT are both manufactured in China. b) KB polymer was used on the Kingdom Tower project in Saudi Arabia which is the tallest tower in the world. The write up from KB International is attached, please also see the overview of projects done from a barge document showing KB Internationals previous experience.	Closed

Contractor's Submission [Document Reference & Revision]	**AFCON/MTL/SN/0205**	Submission Date:	**21 February 2022**
Employer's Representative Reference:	**MTL/RSS/SNR/R20-445/0173**	Response Date:	**23 February 2022**
Submission Description:	**Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**		

No.	Doc Ref (Section)	Employer's Representative Comments	Contractor's Response	Status
3.	Lab Test Report	a) It is noted that the material was sampled and tested in year 2019. Please submit the latest laboratory test report in accordance with Sub-Clause 2 and Table 8.2 of Appendix 16/18 of ER Part B – Specification.	a) An updated material test certificate will be provided in a separate email. All material provided to site will have a material test certificate as per the material batch number.	See below
		<u>Further Comment 1 to No.3</u> a) Please follow up to submit updated material test certificate.	Please refer enclosed letter dated 15-02-2022 from KB International on test certificate. KB International will issue a lab test report based on each material supplied to Afcons as per the Batch number supplied. This report is given after each supply of materials. As a quality control, KB International checks each products batch number before sending this batch of material to our warehouse. KB International will then issue the test certificate once the material is supplied to site.	Closed
4	Clause 1 of Appendix 16/18, Employer's Requirements, Part B:	Clause 1 of Appendix 16/18, Employer's Requirements, Part B: Specification requires among others, a certificate for bentonite or polymer showing the type, the manufacturer's name, the date and place of manufacture and including details of the apparent viscosity range in	The place of manufacture for SlurryPro CDP is China. The Gel Strength and pascal viscosity in polymer drilling fluids does not apply and is only used in Bentonite.	Closed

Contractor's Submission [Document Reference & Revision]	**AFCON/MTL/SN/0205**	Submission Date:	**21 February 2022**
Employer's Representative Reference:	**MTL/RSS/SNR/R20-445/0173**	Response Date:	**23 February 2022**
Submission Description:	**Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**		

No.	Doc Ref (Section)	Employer's Representative Comments	Contractor's Response	Status
	Specification and Certificate of Quality / Manufacturing Details for SlurryPro CDP	Pa.s and the gel strength range in N/m2 for solids in water. The type, the manufacturer's name and the date of manufacture has been mentioned in the submitted Certificate of Quality / Manufacturing Details for SlurryPro CDP but the place of manufacture and details of the apparent viscosity range in Pa.s and the gel strength range in N/m2 for solids in water has not been provided. Please provide details.		
5	Submission Notice ref. AFCONS/MTL /SN/0046	The Submission Notice ref. AFCONS/MTL/SN/0046 is for Material Approval Request for Support Fluid (Polymer) : SlurryPro CDP but the Product Technical Sheet / Product Bulletin / Material Safety Data Sheet / Certificate of Quality / Manufacturing Details / Test Results for the following products are also included: a. KobbleBlok® b. Magma-Fiber® c. EnhancIT 100 d. EnhancIT 200 e. PolyCUT® f. SlurryPro® MPA™ g. 1.5 mtr. PVC Water Stopper (230 X 10)mm Please clarify.	SlurryPro CDP is the base product and will be used with the EnhancIT 100 and 200 to form a drilling fluid. The Kobblebok and MAgmafiber are fluid loss additives to be used if fluid loss is encountered. The PolyCUT material is the base product for use with the reverse circulation machine and the SlurryPro MPA is an additive to help keep the fines under control. All these products are used in conjunction with each other	Closed

Contractor's Submission [Document Reference & Revision]	**AFCON/MTL/SN/0205**	Submission Date:	**21 February 2022**
Employer's Representative Reference:	**MTL/RSS/SNR/R20-445/0173**	Response Date:	**23 February 2022**
Submission Description:	**Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**		

No.	Doc Ref (Section)	Employer's Representative Comments	Contractor's Response	Status
6	Clause 1618 and Appendix 16/18 of ER Part B: Specification	Please be informed that any acceptance given on your proposed SlurryPro CDP is subjected to compliance with Clause 1618 and Appendix 16/18 of ER Part B: Specification including submission of method statement and other submissions in details as specified in the said Clause and Appendix, prior to commencement of work. The Contractor shall demonstrate that the proposed fluid used during the excavation does not affect the pile capacity. In case the selected method/fluid for supporting the excavation used during preliminary piles construction does not prove to be successful, because of the impact on the pile performance, the Contractor shall demonstrate that the required pile performance can be achieved by means of a different supporting method.	KB International has assured Afcons that they will be able to maintain pile stability without jeopardizing the pile capacity in any way.	Closed
		ADDITIONAL COMMENTS:		
7	Clause 1618 of Series 1600 of ER Part B: Specification	<u>Compliance testing of support fluid</u> Please be reminded that the Contractor shall carry out testing of the supporting fluid in accordance with his regime and the ER's specification to demonstrate compliance with his limits for each test. The Contractor shall establish a suitably equipped and properly maintained site laboratory for this sole purpose and	Please refer enclosed letter on compliance to specification by KB International dated 15-02-2022 Clause 16/18 of series 1600 of ER Part B: Specification. KB International will comply with all the points raised, codes and standards in the above mentioned document. KB International will	Closed on the basis that the demonstration and training will be done by KB International on site.

Contractor's Submission [Document Reference & Revision]	**AFCON/MTL/SN/0205**	Submission Date:	**21 February 2022**
Employer's Representative Reference:	**MTL/RSS/SNR/R20-445/0173**	Response Date:	**23 February 2022**
Submission Description:	**Material Approval Request for Support Fluid (Polymer): SlurryPro CDP AFC/5752/MAR/POLY/0023 – Rev.B**		

No.	Doc Ref (Section)	Employer's Representative Comments	Contractor's Response	Status
		provide skilled and experienced staff and all necessary apparatus to undertake the sampling and testing. Resident KB technicians would be recommended for this task.	be available at the start of the project to demonstrate and train Afcons engineers how to properly run the tests and correctly use the polymers.	